

Geology

LOWER-DIVISION TRANSFER PATTERN California State University (CSU) Statewide Pattern

The Lower-Division Transfer Pattern (LDTP) consists of the CSU statewide pattern of coursework outlined below, plus campus-specific coursework, bringing the total pattern to at least 60 but no more than 70 transferable semester units for students to complete at a California Community College (CCC).

The CSU statewide pattern of coursework for CCC students who plan to major in Geology at any CSU campus offering the major includes:

- Completion of lower-division general education requirements, following either the CSU General Education Breadth (GE-Breadth) or the Intersegmental General Education Transfer Curriculum (IGETC) pattern;
- Completion of the CSU graduation requirements in United States History, Constitution and American Ideals; and
- Completion of additional semester units as specified below in (3) to (5).

| CSU Statewide Pattern | Semester Unit Requirement |
|---|---|
| <p>(1) Complete lower-division general education requirements.</p> <p>Obtain a certification of completion of GE-Breadth or IGETC by the California Community College before transferring to a CSU campus. While completing general education, follow the course pattern stated below.</p> <p><i>A minimum grade of C is required in courses used to meet CSU GE Breadth AREAS A and B4.</i></p> <p><i>A minimum grade of C is required in each course used for IGETC.</i></p> | <p>39 units for CSU GE Breadth <i>or</i> 37 units for IGETC</p> |
| <p>(2) Complete the graduation requirements in United States History, Constitution, and American Ideals.</p> <p>These are typically completed with one course each in American government and American history, or a sequence of courses that integrate the history and government topics.</p> | <p>0-6 units Required for CSU GE Breadth</p> |
| (3) Complete Physical Geology/Intro to Geology with lab, [CAN GEOL 2]. | 0-5 units |
| (4) Complete Single Variable Calculus I, [CAN MATH 18]. | 0-4 units |
| (5) Complete General Chemistry for Science Majors I, with lab, [CAN CHEM 2]. | 0-5 units |
| Total Semester Units Required for Statewide LDTP Pattern | 37-59 Units |

Geology

LOWER-DIVISION TRANSFER PATTERN

CSU Bakersfield Campus-Specific Pattern

In addition to the statewide pattern, the following is the CSU Bakersfield campus-specific pattern for the B.A. in Geology.

| Campus-Specific Pattern | Semester Unit Requirement |
|---|---|
| <p>(1) If not taken as part of the statewide pattern complete <u>all</u> of the following:</p> <ul style="list-style-type: none"> • A course that articulates with [CSUB GEOL 201], Physical Geology - Introduction to the geologic processes affecting the solid earth and its atmosphere, oceans, and life forms. <u>And</u> • A course that articulates with [CSUB GEOL 204], Historical Geology - Evolution of the earth's atmosphere, oceans and life and their relationship to continental drift. <u>And</u> • A course that articulates with [CSUB GEOL 205], Environmental Geology - Covers global and local impacts of human manipulation of the environment and geologic processes as hazards. <u>And</u> • A course that articulates with [CSUB CHEM 211], Principles of General Chemistry I - Introduction to atomic structure, quantum theory, periodic properties, chemical reactions, stoichiometry, gas laws and theories, molecular structure and bonding, states of matter, solutions, acids and bases, chemical equilibrium, thermodynamics, oxidation-reduction, electro-chemistry, chemical kinetics, nuclear chemistry, organic chemistry, descriptive chemistry, and coordination chemistry. <u>And</u> • A course that articulates with [CSUB CHEM 212], Principles of General Chemistry II - A continuation of CHEM 211. <u>And</u> • A course that articulates with [CSUB MATH 140], Elementary Statistics - Descriptions of sample data; exploratory data analysis; elementary probability; binomial, normal, t-, F- and other distributions; estimation and hypothesis testing techniques; non-parametric methods; linear regression and correlation; analysis of variance and chi-square tests. <u>And</u> • A course that articulates with [CSUB MATH 201], Calculus I - Introduction to the differential calculus of elementary functions (including logarithmic, exponential, and trigonometric functions). <u>And</u> • A course that articulates with [CSUB MATH 202], Calculus II - Introduction to the integral calculus of elementary functions. <u>And</u> • A course that articulates with [CSUB MATH 222], Laboratory Experience -An introduction to the use of a computer algebra system in exploring applications in differential and integral calculus. <u>And</u> • A course that articulates with [CSUB PHYS 201], Basic Principles of Newtonian Physics - Newtonian mechanics; relationships to contemporary physics; field and laboratory investigations with emphasis on the physical measurements of motion. <u>And</u> • A course that articulate with [CSUB PHYS 222], Classical Physics II - Temperature and heat, kinetic theory of gases, laws of thermodynamics. <u>And</u> • A course that articulates with [CSUB CMPS 221], Programming Fundamentals - Introduces the fundamentals of procedural programming. | <p>0-4 units</p> <p>0-4 units</p> <p>0-4 units</p> <p>0-4 units</p> <p>0-4 units</p> <p>0-4 units</p> <p>0-4 units</p> <p>0-4 units</p> <p>0-2 units</p> <p>0-4 units</p> <p>0-4 units</p> <p>0-2 units</p> |
| <p>(2) If not taken as part of the statewide pattern complete <u>one</u> of the following:</p> <ul style="list-style-type: none"> • A course that articulates with [CSUB PHYS 202], Basic Principles of Maxwellian Physics - Maxwellian electromagnetics; relationships to contemporary physics; field and laboratory investigations in electricity, electronics, magnetism, and heat. <u>Or</u> • A course that articulate with [CSUB PHYS 221], Classical Physics I - Recommended for majors in the physical sciences, mathematics, and engineering. | <p>0-4 units</p> |
| <p>(3) If necessary, complete additional coursework to bring total to 60 transferable semester units.</p> | |

In addition to the statewide pattern, the following is the CSU Bakersfield campus-specific pattern for the B.S. in Geology.

| Campus-Specific Pattern | Semester Unit Requirement |
|--|---------------------------|
| (1) If not taken as part of the statewide pattern complete <u>all</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [CSUB GEOL 201], Physical Geology - Introduction to the geologic processes affecting the solid earth and its atmosphere, oceans, and life forms. | 0-4 units |
| (2) If not taken as part of the statewide pattern complete at least <u>six</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [CSUB CHEM 211], Principles of General Chemistry I - Introduction to atomic structure, quantum theory, periodic properties, chemical reactions, stoichiometry, gas laws and theories, molecular structure and bonding, states of matter, solutions, acids and bases, chemical equilibrium, thermodynamics, oxidation-reduction, electro-chemistry, chemical kinetics, nuclear chemistry, organic chemistry, descriptive chemistry, and coordination chemistry. <u>Or</u> • A course that articulates with [CSUB CHEM 212], Principles of General Chemistry II - A continuation of CHEM 211. <u>Or</u> • A course that articulates with [CSUB MATH 140], Elementary Statistics - Descriptions of sample data; exploratory data analysis; elementary probability; binomial, normal, t-, F- and other distributions; estimation and hypothesis testing techniques; non-parametric methods; linear regression and correlation; analysis of variance and chi-square tests. <u>Or</u> • A course that articulates with [CSUB MATH 191], Pre-calculus I: College Algebra - The algebraic and graphical analysis of polynomial, rational, logarithmic, and exponential functions and their applications. <u>Or</u> • A course that articulates with [CSUB MATH 192], Pre-calculus Mathematics II: Trigonometric Functions - The algebraic, geometric, and graphical analysis of trigonometric functions and their applications. <u>Or</u> • A course that articulates with [CSUB PHYS 201], Basic Principles of Newtonian Physics - Newtonian mechanics; relationships to contemporary physics; field and laboratory investigations with emphasis on the physical measurements of motion. <u>Or</u> • A course that articulates with [CSUB PHYS 202], Basic Principles of Maxwellian Physics - Maxwellian electromagnetics; relationships to contemporary physics; field and laboratory investigations in electricity, electronics, magnetism, and heat. | 0-24 units |
| (3) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |

Geology
LOWER-DIVISION TRANSFER PATTERN
CSU Channel Islands Campus-Specific Pattern

This campus does not have a major, concentration, or option in Geology.

Geology
LOWER-DIVISION TRANSFER PATTERN
CSU Chico Campus-Specific Pattern

In addition to the statewide pattern, the following is the CSU Chico campus-specific pattern for the Major in Geology.

| Campus-Specific Pattern | Semester Unit Requirement |
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| (1) If not taken as part of the statewide pattern complete the following: <ul style="list-style-type: none"> • A course that articulates with [CSUC GEOS 203], Historical Geology with Lab. | 0-3 units |

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| (2) If not taken as part of the statewide pattern complete at least <u>one</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [CSUC PHYS 202A], General Physics, 1st Semester. <u>Or</u> • A course that articulates with [CSUC PHYS 204A], Physics: Mechanics. | 0-4 units |
| (3) If not taken as part of the statewide pattern complete at least <u>one</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [CSUC MATH 105], Statistics. <u>Or</u> • A course that articulates with [CSUC MATH 121], Calculus, 2nd Semester. | 0-4 units |
| (4) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |
| <i>Recommend Coursework:</i> <ul style="list-style-type: none"> • A course that articulates with [CSUC PHYS 204A], Physics: Mechanics. <u>And</u> • A course that articulates with [CSUC PHYS 204B], Physics: Electricity Magnetism. <u>And</u> • A course that articulates with [CSUC CHEM 112], General Chemistry II. <u>And</u> • A course that articulates with [CSUC MATH 121], Calculus, 2nd Semester. | |

Geology LOWER-DIVISION TRANSFER PATTERN CSU Dominguez Hills Campus-Specific Pattern

In addition to the statewide pattern, the following is the CSU Dominguez Hills campus-specific pattern.

| Campus-Specific Pattern | Semester Unit Requirement |
|--|--|
| (1) If not taken as part of the statewide pattern complete <u>all</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [CSUDH CHE 112], General Chemistry II (with laboratory). <u>And</u> • A course that articulates with [CSUDH MAT 193], Calculus II. <u>And</u> • A course that articulates with [CSUDH EAR 200], Historical Geology. <u>And</u> • A course that articulates with [CSUDH PHY 120], Elements of Physics I (Algebra/Trig based). | 0-5 units 0-4 units 0-4 units 0-4 units |
| (2) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |

Geology LOWER-DIVISION TRANSFER PATTERN CSU East Bay Campus-Specific Pattern

In addition to the statewide pattern, the following is the CSU East Bay campus-specific pattern for the B.A. in Geology:

| Campus-Specific Pattern | Semester Unit Requirement |
|---|---------------------------|
| (1) If not taken as part of the statewide pattern complete the following: <ul style="list-style-type: none"> • A course that articulates with [CSUEB GEOL 2102], Earth and Life Through Time. | 0-3 units |
| (2) If not taken as part of the statewide pattern, complete <u>one</u> of the following chemistry/physics sequences: <ul style="list-style-type: none"> • Complete <u>all</u> of the following: <ul style="list-style-type: none"> ○ Courses that articulate with [CSUEB CHEM 1101, 1102, and 1103], General Chemistry sequence. <u>And</u> ○ Courses that articulate with [CSUEB PHYS 1700 and 1780], Elementary Physics and Lab. <u>Or</u> • Complete <u>all</u> of the following: <ul style="list-style-type: none"> ○ A course that articulates with [CSUEB CHEM 1100], Introduction to College Chemistry. <u>And</u> | 0-12 units |

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| o Courses that articulate with [CSUEB PHYS 2701, 2702, and 2703], Introductory Physics sequence. | |
| (3) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |

In addition to the statewide pattern, the following is the CSU East Bay campus-specific pattern for the B.S. in Geology:

| Campus-Specific Pattern | Semester Unit Requirement |
|--|--|
| (1) If not taken as part of the statewide pattern complete <u>all</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [CSUEB GEOL 2102], Earth and Life Through Time. <u>And</u> • Courses that articulate with [CSUEB CHEM 1101, 1102, and 1103], General Chemistry sequence. <u>And</u> • Courses that articulate with [CSUEB MATH 1304 and 1305], Calculus I & II. | <p>0-3 units</p> <p>0-8 units</p> <p>0-3 units</p> |
| (2) If not taken as part of the statewide pattern, complete courses from one of the following physics sequences to bring total up to 60, and not more than 70 transferable semester units: <ul style="list-style-type: none"> • Courses that articulate with [CSUEB PHYS 1001, 1002, and 1003], General Physics sequence. <u>Or</u> • Courses that articulate with [CSUEB PHYS 2701, 2702, and 2703], Introductory Physics sequence. <p><i>Students are strongly urged to complete PHYS 1001, 1002 and 1003; this requires completion of MATH 2304, Calculus III.</i></p> | 0-12 units |
| (3) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |

Geology LOWER-DIVISION TRANSFER PATTERN CSU Fresno Campus-Specific Pattern

In addition to the statewide pattern, the following is the CSU Fresno campus-specific pattern.

| Campus-Specific Pattern | Semester Unit Requirement |
|---|---|
| (1) If not taken as part of the statewide pattern complete <u>all</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [CSUF EES 2], Historical Geology. <u>And</u> • A course that articulates with [CSUF EES 12], Mineralogy. <u>And</u> • A course that articulates with [CSUF PHYS 2A], General Physics. <u>And</u> • A course that articulates with [CSUF PHYS 2B], General Physics. <u>And</u> • A course that articulates with [CSUF CHEM 1B], General Chemistry. | <p>0-3 units</p> <p>0-4 units</p> <p>0-4 units</p> <p>0-5 units</p> |
| (2) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |

Geology LOWER-DIVISION TRANSFER PATTERN CSU Fullerton Campus-Specific Pattern

In addition to the statewide pattern, the following is the CSU Fullerton campus-specific pattern.

| Campus-Specific Pattern | Semester Unit Requirement |
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| (1) If not taken as part of the statewide pattern complete <u>all</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [CSUF GEOL 201], Historical Geology with a Lab. <u>And</u> • A course that articulates with [CSUF MATH 150B], 2nd semester Calculus II. | <p>0-4 units</p> <p>0-4 units</p> |

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|--|--------------------------------------|
| <ul style="list-style-type: none"> • <u>And</u> • A course that articulates with [CSUF CHEM 120B], General Chemistry. <u>And</u> • A course that articulates with [CSUF PHYS 225 & PHYS 225L], 1st semester Physics. | 0-5 units 0-4 units |
| (2) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |

Geology

LOWER-DIVISION TRANSFER PATTERN

Humboldt State University Campus-Specific Pattern

In addition to the statewide pattern, the following is the Humboldt State University campus-specific pattern for the B.A. and B.S. in Geology.

| Campus-Specific Pattern | Semester Unit Requirement |
|--|--------------------------------------|
| (1) If not taken as part of the statewide pattern complete <u>all</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [HSU MATH 110], Calculus II. <u>And</u> • A course that articulates with [HSU CHEM 110], General Chemistry. | 0-4 units 0-5 units |
| (2) If not taken as part of the statewide pattern complete at least <u>one</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [HSU MATH 210], Calculus III. <u>Or</u> • A course that articulates with [HSU STAT 108], Elementary Statistics. <u>Or</u> • A course that articulates with [HSU BIOM 109], Introductory Biometrics. | 0-4 units |
| (3) If not taken as part of the statewide pattern complete at least <u>one</u> of the following: <ul style="list-style-type: none"> • Complete <u>all</u> of the following: <ul style="list-style-type: none"> ○ A course that articulates with [HSU PHYX 106], College General Physics: Mechanics & Heat. <u>And</u> ○ A course that articulates with [HSU PHYX 107], College Physics: Electromagnetism & Modern Physics. <u>Or</u> • Complete <u>all</u> of the following: <ul style="list-style-type: none"> ○ A course that articulates with [HSU PHYX 109], General Physics I: Mechanics. <u>And</u> ○ A course that articulates with [HSU PHYX 110], General Physics II: Electricity, Heat. | 0-4 units |
| (4) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |

In addition to the statewide pattern, the following is the Humboldt State University campus-specific pattern for the B.A. in Geosciences.

| Campus-Specific Pattern | Semester Unit Requirement |
|--|--|
| (1) If not taken as part of the statewide pattern complete <u>all</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [HSU BIOL 105], Principles of Biology. <u>And</u> • A course that articulates with [HSU PHYX 106], College General Physics: Mechanics & Heat. <u>And</u> • A course that articulates with [HSU PHYX 107], College Physics: Electromagnetism & Modern Physics. <u>And</u> • A course that articulates with [HSU CHEM 110], General Chemistry. <u>And</u> • A course that articulates with [HSU MATH 105], Calculus for the Biological Sciences and Natural Resources. <i>If a more difficult calculus course has been taken, i.e. an equivalent to HSU Math 109 Calculus I, Math 105 is not required</i> | 0-5 units 0-5 units 0-4 units 0-5 units 0-4 units |
| (2) If not taken as part of the statewide pattern complete at least <u>one</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [HSU BOT 105], General Botany. <u>Or</u> • A course that articulates with [HSU ZOOL 110], General Zoology. | 0-4 units |
| (3) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |

Geology

LOWER-DIVISION TRANSFER PATTERN

CSU Long Beach Campus-Specific Pattern

In addition to the statewide pattern, the following is the CSU Long Beach campus-specific pattern for the B.S. in Earth Science:

| Campus-Specific Pattern | Semester Unit Requirement |
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| (1) If not taken as part of the statewide pattern, complete <u>all</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [CSULB MATH 123], Calculus II. <u>And</u> • A course that articulates with [CSULB CHEM 111B], General Chemistry. <u>And</u> • A course that articulates with [CSULB PHYS 151], Mechanics and Heat. <u>And</u> • A course that articulates with [CSULB GEOL 240], Historical Geology. | 0-4 units 0-5 units 0-4 units 0-4 units |
| (2) If necessary complete additional coursework to bring total to 60 transferable semester units. <u>Recommended Courses:</u> <ul style="list-style-type: none"> • A course that articulates with [CSULB PHYS 152], <i>Electricity and Magnetism.</i> | |

In addition to the statewide pattern, the following is the CSU Long Beach campus-specific pattern for the B.S. in Geology:

| Campus-Specific Pattern | Semester Unit Requirement |
|--|--|
| (1) If not taken as part of the statewide pattern, complete <u>all</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [CSULB MATH 123], Calculus II. <u>And</u> • A course that articulates with [CSULB CHEM 111B], General Chemistry. <u>And</u> • A course that articulates with [CSULB PHYS 151], Mechanics and Heat. <u>And</u> • A course that articulates with [CSULB GEOL 240], Historical Geology. | 0-4 units 0-5 units 0-4 units 0-4 units |
| (2) If necessary complete additional coursework to bring total to 60 transferable semester units. <u>Recommended Courses:</u> <ul style="list-style-type: none"> • A course that articulates with [CSULB PHYS 152], <i>Electricity and Magnetism.</i> • A course that articulates with [CSULB BIOL 200], <i>General Biology.</i> | |

Geology

LOWER-DIVISION TRANSFER PATTERN

CSU Los Angeles Campus-Specific Pattern

In addition to the statewide pattern, the following is the CSU Los Angeles campus-specific pattern for the B.S. in Geology.

| Campus-Specific Pattern | Semester Unit Requirement |
|--|--|
| (1) If not taken as part of the statewide pattern complete all of the following: <ul style="list-style-type: none"> • A course that articulates with [CAN CHEM 4], Chemistry II and Lab. <u>And</u> • A course that articulates with [CAN MATH 20], Calculus II. <u>And</u> • A course that articulates with [CAN GEOL 4], Historical Geology and Mineralogy. | 0-5 units 0-4 units 0-4 units |
| (2) If not taken as part of the statewide pattern complete at least <u>one</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [CAN PHYS 2], General Physics with Algebra and Trigonometry. <u>Or</u> • A course that articulates with [CAN PHYS 8], General Physics with Calculus I and Lab. | 0-4 units |
| (3) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |

Geology
LOWER-DIVISION TRANSFER PATTERN
California Maritime Academy Campus-Specific Pattern

This campus does not have a major, concentration, or option in Geology.

Geology
LOWER-DIVISION TRANSFER PATTERN
CSU Monterey Bay Campus-Specific Pattern

This campus does not have a major, concentration, or option in Geology.

Geology
LOWER-DIVISION TRANSFER PATTERN
CSU Northridge Campus-Specific Pattern

In addition to the statewide pattern, the following is the CSU Northridge campus-specific pattern for the B.S. in Geological Sciences; B.S. in Secondary Teaching; and B.S. in Environmental Geology:

| Campus-Specific Pattern | Semester Unit Requirement |
|--|--|
| (1) If not taken as part of the statewide pattern complete <u>all</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [CAN CHEM 4], General Chemistry with Lab. <u>And</u> • A course that articulates with [CAN PHYS 8], Physics: Mechanics & Heat. <u>And</u> • A course that articulates with [CAN GEOL 4], Historical Geology with Lab. | 0-5 units 0-4 units 0-4 units |
| (2) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |
| <u>Recommended Courses:</u> <ul style="list-style-type: none"> • <i>A course that articulates with [CAN PHYS 12], Physics: Electricity & Magnetism.</i> | |

Geology
LOWER-DIVISION TRANSFER PATTERN
Cal Poly Pomona Campus-Specific Pattern

In addition to the statewide pattern, the following is the Cal Poly Pomona campus-specific pattern for the B.S. in Integrated Earth Studies:

| Campus-Specific Pattern | Semester Unit Requirement |
|---|--|
| (1) If not taken as part of the statewide pattern complete <u>all</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [CPP GSC 112/151L], Historical Geology – A course that focuses on the composition history and dynamics of the solar system (the sun, planets, moons, comets, asteroids, and meteors) and theories of its origin and evolution. Also examines the nature of stars, galaxies, and the universe as interpreted from analysis of starlight. <u>And</u> • A course that articulates with [CPP GSC 116], Introduction to Astronomy – A course in the identification, occurrence, origin and uses of the common minerals; quantitative x-ray diffraction microanalysis; physical and chemical properties of minerals and introductory morphologic crystallography. <u>And</u> | 0-4 units 0-3 units |

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| <ul style="list-style-type: none"> • A course that articulates with [CPP GSC 215/215L], Mineralogy with Lab. | 0-4 units |
| (2) If not taken as part of the statewide pattern complete at least <u>one</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [CPP CHM 121/121L, 122/122L & 123/123L], Chemistry. <u>Or</u> • A course that articulates with [CPP PHY 121/121L, 122/122L & 123/123L], Algebra-based Physics. | 0-3 units |
| (3) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |

In addition to the statewide pattern, the following is the Cal Poly Pomona campus-specific pattern for the B.S. in Geology:

| Campus-Specific Pattern | Semester Unit Requirement |
|--|--|
| (1) If not taken as part of the statewide pattern complete <u>all</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [CPP GSC 112/151L], Historical Geology. <u>And</u> • A course that articulates with [CPP GSC 215/215L], Mineralogy with Lab - A course in the identification, occurrence, origin and uses of the common minerals; quantitative x-ray diffraction microanalysis, physical and chemical properties of minerals and introductory morphologic crystallography. <u>And</u> • A course that articulates with [CPP MAT 114, 115 & 116], Single Variable Calculus II. | 0-4 units 0-4 units 0-4 units |
| (2) If not taken as part of the statewide pattern complete at least <u>one</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [CPP CHM 121/121L, 122/122L & 123/123L], Chemistry. <u>Or</u> • A course that articulates with [CPP PHY 131/131L, 132/132L & 133/133L], Calculus-based Physics. | 0-3 units |
| (3) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |

Geology LOWER-DIVISION TRANSFER PATTERN CSU Sacramento Campus-Specific Pattern

In addition to the statewide pattern, the following is the CSU Sacramento campus-specific pattern.

| Campus-Specific Pattern | Semester Unit Requirement |
|---|----------------------------------|
| (1) If not taken as part of the statewide pattern complete the following: <ul style="list-style-type: none"> • A course that articulates with [CSUS GEOL 12 & 12L], Historical Geology. | 0-4 units |
| (2) If not taken as part of the statewide pattern complete at least <u>one</u> the following: <ul style="list-style-type: none"> • A course that articulates with [CSUS PHYS 5A], General Physics: Mechanics, Heat, Sound. <u>Or</u> • A course that articulates with [CSUS PHYS 11A], General Physics: Mechanics. | 0-4 units |
| (3) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |

Geology LOWER-DIVISION TRANSFER PATTERN CSU San Bernardino Campus-Specific Pattern

In addition to the statewide pattern, the following is the CSU San Bernardino campus-specific pattern for the B.A. in Geology:

| Campus-Specific Pattern | Semester Unit Requirement |
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| (1) If not taken as part of the statewide pattern complete the following: | |

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| <ul style="list-style-type: none"> • A course that articulates with [CSUSB PHYS 221, 222, & 223], One-year sequence of Physics. | 0-4 units |
| (2) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |

In addition to the statewide pattern, the following is the CSU San Bernardino campus-specific pattern for the B.S in Geology:

| Campus-Specific Pattern | Semester Unit Requirement |
|--|--|
| (1) If not taken as part of the statewide pattern complete <u>all</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [CSUSB PHYS 221, 222, & 223], One year of Physics – A course that covers chemical kinetics and equilibrium, thermodynamics, redox reactions and electrochemistry, and topics in inorganic, organic, biological, and environmental chemistry. <u>And</u> • A course that articulates with [CSUSB CHEM 16], General Chemistry II with Lab - A course that covers topics from integral calculus and an introduction to elementary differential equations. <u>And</u> • A course that articulates with [CSUSB MATH 122], Calculus for the Life Sciences II. | 0-4 units 0-5 units 0-4 units |
| (2) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |

Geology LOWER-DIVISION TRANSFER PATTERN San Diego State University Campus-Specific Pattern

In addition to the statewide pattern, the following is the San Diego State University campus-specific pattern.

| Campus-Specific Pattern | Semester Unit Requirement |
|--|--|
| (1) If not taken as part of the statewide pattern, complete <u>all</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [SDSU BIOL 100], General Biology - A beginning course in biology stressing processes common to living organisms. <u>And</u> • A course that articulates with [SDSU CHEM 201], General Chemistry - Continuation of CHEM 200. General principles of chemistry with emphasis on inorganic materials and qualitative analysis. <u>And</u> • A course that articulates with [SDSU MATH 151], Calculus II - A course that covers techniques and applications of integration; improper integrals; differential equations; infinite series; conic sections; curves in parametric form; polar coordinates. <u>And</u> • A course that articulates with [SDSU GEOL 221], Mineralogy - Practice in determination of common minerals: their geologic environment, utilization, and economic significance. Introduction to optical techniques in mineral identification. <u>And</u> • A course that articulates with [SDSU PHYS 195], Principles of Physics - Fundamental principles of physics in areas of mechanics and oscillatory motion. Designed for students requiring calculus-based physics. <u>And</u> • A course that articulates with [SDSU PHYS 196], Principles of Physics - Fundamental principles of physics in areas of electricity and magnetism. Designed for students requiring calculus-based physics. | 0-3 units 0-5 units 0-4 units 0-4 units 0-3 units 0-3 units |
| (2) If necessary, complete additional coursework to bring total to 60 (but not more than 70) transferable semester units. Coursework not taken at the community college must be completed at SDSU. | |

Geology
LOWER-DIVISION TRANSFER PATTERN
San Francisco State University Campus-Specific Pattern

In addition to the statewide pattern, the following is the San Francisco State University campus-specific pattern for the B.A. in Geology:

| Campus-Specific Pattern | Semester Unit Requirement |
|---|---|
| (1) If not taken as part of the statewide pattern complete <u>all</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [CAN GEOL 8], Historical Geology and Paleontology. <u>And</u> • A course that articulates with [CAN PHYS 2], General Physics I and Lab. <u>And</u> • A course that articulates with [CAN PHYS 4], General Physics II and Lab. | 0-3 units 0-4 units 0-4 units |
| (2) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |

In addition to the statewide pattern, the following is the San Francisco State University campus-specific pattern for the B.S. in Geology:

| Campus-Specific Pattern | Semester Unit Requirement |
|--|-------------------------------------|
| (1) If not taken as part of the statewide pattern complete <u>all</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [CAN CHEM 4], General Chemistry II and Lab. <u>And</u> • A course that articulates with [CAN MATH 20], Calculus II. <u>And</u> • A course that articulates with [CAN PHYS 8], General Physics with Calculus I and Lab. | 0-5 units 0-4 units 0-4 units |
| (2) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |

Geology
LOWER-DIVISION TRANSFER PATTERN
San José State University Campus-Specific Pattern

In addition to the statewide pattern, the following is the San José State University campus-specific pattern for the B.S. in Geology:

| Campus-Specific Pattern | Semester Unit Requirement |
|--|---|
| (1) If not taken as part of the statewide pattern, complete courses from the following to bring total up to 60, and not more than 70 transferable semester units: <ul style="list-style-type: none"> • A course that articulates with [SJSU ENGL 001B], Composition 2, or an equivalent 2nd Semester English Composition course approved for IGETC Area 1B. <i>A minimum grade of C or higher is required in courses used to meet this requirement.</i> <u>And</u> • Physical Activity. <i>Two units taken in at least two different activities.</i> <u>And</u> • Courses that articulate with [SJSU CHEM 001A & CHEM 001B], General Chemistry. <i>CHEM 001A & 001B must be completed at the same institution to meet this requirement.</i> <u>And</u> • A course that articulates with [SJSU PHYS 050], General/Physics/Mechanics. | 0-3 units 0-2 units 0-10 units 0-4 units |
| (2) If not taken as part of the statewide pattern complete <u>one</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [SJSU PHYS 051], General Physics/Electricity and Magnetism. <u>Or</u> • A course that articulates with [SJSU PHYS 052], General Physics/Heat and Light. | 0-4 units |
| (3) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |

In addition to the statewide pattern, the following is the San José State University campus-specific pattern for the B.A. in Earth Science:

| Campus-Specific Pattern | Semester Unit Requirement |
|---|---|
| <p>(1) If not taken as part of the statewide pattern, complete courses from the following to bring total up to 60, and not more than 70 transferable semester units:</p> <ul style="list-style-type: none"> • A course that articulates with [SJSU ENGL 001B], Composition 2, or an equivalent 2nd Semester English Composition course approved for IGETC Area 1B. <i>A minimum grade of C or higher is required in courses used to meet this requirement.</i> <u>And</u> • Physical Activity. <i>Two units taken in at least two different activities.</i> <u>And</u> • Courses that articulate with [SJSU CHEM 001A & CHEM 001B], General Chemistry. <i>CHEM 001A & 001B must be completed at the same institution to meet this requirement.</i> <u>And</u> • A course that articulates with [SJSU PHYS 002A], Fundamentals of Physics. <u>And</u> • A course that articulates with [SJSU PHYS 002B], Fundamentals of Physics. <u>And</u> • A course that articulates with [SJSU GEOL 007], Earth, Time and Life. | <p style="text-align: center;">0-3 units</p> <p style="text-align: center;">0-2 units 0-10 units</p> <p style="text-align: center;">0-4 units</p> <p style="text-align: center;">0-4 units</p> <p style="text-align: center;">0-3 units</p> |
| <p>(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.</p> | |

Geology
LOWER-DIVISION TRANSFER PATTERN
Cal Poly San Luis Obispo Campus-Specific Pattern

This campus does not have a major, concentration, or option in Geology.

Geology
LOWER-DIVISION TRANSFER PATTERN
CSU San Marcos Campus-Specific Pattern

This campus does not have a major, concentration, or option in Geology.

Geology
LOWER-DIVISION TRANSFER PATTERN
Sonoma State University Campus-Specific Pattern

In addition to the statewide pattern, the following is the Sonoma State University campus-specific pattern.

| Campus-Specific Pattern | Semester Unit Requirement |
|---|--|
| <p>(1) If not taken as part of the statewide pattern complete <u>all</u> of the following:</p> <ul style="list-style-type: none"> • A course that articulates with [SSU MATH 211S], Calculus II - A course that includes the calculus of exponential and logarithmic functions; trigonometric and inverse trigonometric functions; numerical integration; techniques of integration; introduction to applications of integration; differential equations; Taylor polynomials; improper integrals; series; and introduction to partial derivatives. <u>And</u> • A course that articulates with [SSU CHEM 115A and 115B], Chemistry II - An introduction to science and scientific thought by using problem-solving strategies in both a conceptual and mathematical manner, with topics that include atomic and molecular structure, states of matter, chemical reactions, stoichiometry and thermodynamics. <u>And</u> • A course that articulates with [SSU PHYS 114 and 116], Physics I with Lab - An | <p style="text-align: center;">0-4 units</p> <p style="text-align: center;">0-5 units</p> <p style="text-align: center;">0-4 units</p> |

| | |
|---|------------------|
| introduction to vectors; classical mechanics, including particle dynamics and fluid mechanics; simple harmonic motion; thermodynamics and kinetics. <u>And</u> <ul style="list-style-type: none"> • A course that articulates with [SSU PHYS 214 and 216], Physics II with Lab - A course that covers electrostatics, quasistatic fields and currents, magnetostatics; electromagnetic induction; waves; physical and geometric optics. | 0-4 units |
| (2) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |

Geology LOWER-DIVISION TRANSFER PATTERN CSU Stanislaus Campus-Specific Pattern

In addition to the statewide pattern, the following is the CSU Stanislaus campus-specific pattern.

| Campus-Specific Pattern | Semester Unit Requirement |
|---|--|
| (1) If not taken as part of the statewide pattern complete <u>all</u> of the following: <ul style="list-style-type: none"> • A course that articulates with College Physics for Science Majors, 1st semester, with corresponding laboratory. <u>And</u> • A course that articulates with College Algebra. <u>And</u> • A course that articulates with College Trigonometry. <u>And</u> • A course that articulates with Historical Geology and a corresponding laboratory. | 0-5 units 0-3 units 0-3 units 0-4 units |
| (2) If necessary, complete additional coursework to bring total to 60 transferable semester units. | |