

Chemistry and Biochemistry

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 Chemistry or Biochemistry at any CSU campus offering the major includes:

- Completion of lower-division general education requirements, following either the CSU General Education 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), (4), and (5).

Please note that the information here is an academic and curricular advising tool: a roadmap that enables transfer students to efficiently and effectively progress towards the CSU baccalaureate degree in a specified discipline. California Community College students should work closely with their advisers when planning their academic program in preparation for transfer to the CSU.

This information does not represent any guarantee with regard to admission nor does it include or replace CSU campus admissions impaction criteria (see <http://www.calstate.edu/AR/impactioninfo.shtml>). These curricular guidelines are subject to change.

CSU Statewide Pattern	Semester Unit Requirement
<p>(1) Complete lower-division general education requirements.</p> <p>Obtain a certification of completion of CSU 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</p>
<p>(3) Complete Single Variable Calculus I, [CAN MATH 18].</p> <p><i>A minimum grade of C is necessary to meet this requirement.</i></p>	<p>0-4 units</p>
<p>(4) Complete at least <u>one</u> of the following:</p> <ul style="list-style-type: none"> • Coursework that articulates with [CAN PHYS 8], Physics - Calculus Base I. <i>Or</i> • Coursework that articulates with [CAN PHYS 2], Physics - Algebra and Trigonometry Based. <p><i>A minimum grade of C is necessary to meet this requirement.</i></p>	<p>0-3 units</p>
<p>(5) Complete General Chemistry for Science Majors Sequence, with Lab, [CAN CHEM SEQ A].</p>	<p>10 units</p>

<i>Courses used to meet this requirement may not be used to complete CSU GE Breadth or IGETC requirements.</i>	
Total Semester Units Required for Statewide LDTP Pattern	47-57 Units

Chemistry and Biochemistry LOWER-DIVISION TRANSFER PATTERN CSU Bakersfield Campus-Specific Pattern

In addition to the statewide pattern, the following is the CSU Bakersfield campus-specific pattern in Chemistry:

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 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 CHEM 213], Principles of General Chemistry III - A continuation of CHEM 212. <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 203], Calculus III - Three dimensional analytic geometry; polar coordinates; parametric curves; functions of several variables; partial and directional derivatives; the chain rule; gradients; optimization. <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 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>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 articulate with [CSUB PHYS 223], Optics and Modern Physics - Physical optics, relativity, black-body radiation, wave-particle duality, atomic models, introduction to quantum theory, atomic structure, radioactivity and nuclear structure. 	<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>0-4 units</p> <p>0-4 units</p> <p>0-4 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 203], Basic Principles of Contemporary Physics - Modern physics; principles of relativity, quantum phenomena, light, and the structure of matter. Observations and investigations related to atomic, nuclear, and molecular structure. <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 in Biochemistry:

Campus-Specific Pattern	Semester Unit Requirement
<p>(1) If not taken as part of the statewide pattern complete the following:</p> <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, 	<p>0-4 units</p>

<p>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></p> <ul style="list-style-type: none"> • 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 CHEM 213], Principles of General Chemistry III - A continuation of CHEM 212. <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 203], Calculus III - Three dimensional analytic geometry; polar coordinates; parametric curves; functions of several variables; partial and directional derivatives; the chain rule; gradients; optimization. <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 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>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 articulate with [CSUB PHYS 223], Optics and Modern Physics - Physical optics, relativity, black-body radiation, wave-particle duality, atomic models, introduction to quantum theory, atomic structure, radioactivity and nuclear structure. 	<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>0-4 units</p> <p>0-4 units</p>
<p>(2) If not taken as part of the statewide pattern complete at least one of the following:</p> <ul style="list-style-type: none"> • A course that articulates with [CSUB PHYS 203], Basic Principles of Contemporary Physics - Modern physics; principles of relativity, quantum phenomena, light, and the structure of matter. Observations and investigations related to atomic, nuclear, and molecular structure. <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 not taken as part of the statewide pattern complete at least two of the following:</p> <ul style="list-style-type: none"> • A course that articulates with [CSUB BIOL 201], Introductory Biology - Cells - Cell structure and function with emphasis on molecular aspects. <u>Or</u> • A course that articulates with [CSUB BIOL 202], Introductory Biology - Animals - Function, form, and diversity of animals. <u>Or</u> • A course that articulates with [CSUB BIOL 203], Introductory Biology - Plants - Plant structure, function, and diversity with emphasis placed on ecological and evolutionary aspects of seed plants. 	<p>0-8 units</p>
<p>(4) If necessary, complete additional coursework to bring total to 60 transferable semester units.</p>	

Chemistry and Biochemistry LOWER-DIVISION TRANSFER PATTERN CSU Channel Islands Campus-Specific Pattern

In addition to the statewide pattern, the following is the CSU Channel Islands campus-specific pattern for the B.S. in Chemistry:

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"> • Coursework that articulates with [CSUCI CHEM 250 and 251], Quantitative Analysis & Lab. <u>And</u> • Coursework that articulates with [CSUCI MATH 151], Calculus II. 	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"> • Coursework that articulates with [CSUCI PHYS 101], Introduction to Physics II. <u>Or</u> • Coursework that articulates with [CSUCI PHYS 201], General Physics II. 	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 CSU Channel Islands campus-specific pattern for the B.A. in Chemistry:

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"> • Coursework that articulates with [CSUCI CHEM 250 and 251], Quantitative Analysis & Lab. <u>And</u> • Coursework that articulates with [CSUCI MATH 151], Calculus II. 	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"> • Coursework that articulates with [CSUCI PHYS 101], Introduction to Physics II. <u>Or</u> • Coursework that articulates with [CSUCI PHYS 201], General Physics II 	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 CSU Channel Islands campus-specific pattern for the B.S. in Chemistry, Biochemistry Option:

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"> • Coursework that articulates with [CSUCI CHEM 250 and 251], Quantitative Analysis & Lab. <u>And</u> • Coursework that articulates with [CSUCI MATH 151], Calculus II. <u>And</u> • Coursework that articulates with [CSUCI BIOL 200], Principles of Organismal and Population Biology. <u>And</u> • Coursework that articulates with [CSUCI BIOL 201], Principles of Cell and Molecular Biology. 	0-4 units 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"> • Coursework that articulates with [CSUCI PHYS 101], Introduction to Physics II. <u>Or</u> • Coursework that articulates with [CSUCI PHYS 201], General Physics II. 	0-4 units
(3) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

**Chemistry and Biochemistry
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 B.S. in Chemistry:

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"> • Courses that articulate with [CSUC PHYS 204A, 204B and 204C], three semesters of Physics (Calculus-based). <u>And</u> • Courses that articulate with [CSUC MATH 120 & 121], two semesters of Calculus. • A course that articulates with [CSUC CHEM 270], Organic Chemistry with Lab. 	0-8 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 CSU Chico campus-specific pattern for the B.S. in Biochemistry:

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"> • Courses that articulate with [CSUC PHYS 202A & 202B], two semesters of Physics (Algebra/Trig based). <u>And</u> • Courses that articulate with [CSUC MATH 120 & 121], two semesters of Calculus. <u>And</u> • A course that articulates with [CSUC BIOL 151], Principles of Cell and Molecular Biology. <u>And</u> • A course that articulates with [CSUC CHEM 270], Organic Chemistry with Lab. 	0-4 units
	0-4 units
	0-4 units
	0-4 units
(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

**Chemistry and Biochemistry
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 for the B.S. in Chemistry:

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 courses that articulates with [CSUDH CHE 230], Quantitative Analysis. <u>And</u> • A courses that articulates with [CSUDH MAT 193], Calculus II. <u>And</u> • A courses that articulates with [CSUDH MAT 211], Calculus III. <u>And</u> • A courses that articulates with [CSUDH PHY 130], General Physics I. <u>And</u> • A courses that articulates with [CSUDH PHY 132], General Physics II. 	0-4 units
	0-5 units
	0-5 units
	0-5 units
	0-5 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 Dominguez Hills campus-specific pattern for the B.A. in Chemistry:

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 courses that articulates with [CSUDH CHE 230], Quantitative Analysis. <u>And</u> • A courses that articulates with [CSUDH MAT 193], Calculus II. <u>And</u> • Complete <u>one</u> of the following sequences of courses: <ul style="list-style-type: none"> ○ A courses that articulates with [CSUDH PHY 130], General Physics 1. <u>And</u> ○ A courses that articulates with [CSUDH PHY 132], General Physics II. <u>Or</u> ○ A courses that articulates with [CSUDH PHY 120], Elements of Physics I. <u>And</u> ○ A courses that articulates with [CSUDH PHY 122], Elements of Physics II. 	0-4 units 0-5 units 0-5 units 0-5 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 CSU Dominguez Hills campus-specific pattern for the B.S. in Biochemistry:

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 courses that articulates with [CSUDH BIO 120], Principles of Biology I. <u>And</u> • A courses that articulates with [CSUDH BIO 121], Principles of Biology I Lab. <u>And</u> • A courses that articulates with [CSUDH BIO 122], Principles of Biology II. <u>And</u> • A courses that articulates with [CSUDH BIO 123], Principles of Biology II Lab. <u>And</u> • A courses that articulates with [CSUDH CHE 230], Quantitative Analysis. <u>And</u> • A courses that articulates with [CSUDH MAT 193], Calculus II. <u>And</u> • A courses that articulates with [CSUDH PHY 130], General Physics I. <u>And</u> • A courses that articulates with [CSUDH PHY 132], General Physics II. 	0-4 units 0-1 units 0-3 units 0-1 units 0-4 units 0-5 units 0-5 units 0-5 units
(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

Chemistry and Biochemistry 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 Chemistry:

Campus-Specific Pattern	Semester Unit Requirement
(3) 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"> • Courses that articulate with [CSUEB PHYS 2701, 2702, and 2703], Introductory Physics sequence. <u>And</u> • Courses that articulate with [CSUEB MATH 1304 and 1305], Calculus I & II. 	0-4 units 0-3 units
(4) If not taken as part of the statewide pattern, complete <u>one</u> course 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 [CSUEB CS 1020], Introduction to Computers. <u>Or</u> • A course that articulates with [CSUEB CS 1160], Introduction to Computer Science and Programming Methods. 	0-3 units
(5) 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 Chemistry:

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"> • Courses that articulate with [CSUEB MATH 1304, 1305 and 2304], Calculus I, II & III. <u>And</u> • Courses that articulate with [CSUEB PHYS 1001, 1002, and 1003], General Physics sequence. 	<p>0-6 units</p> <p>0-8 units</p>
<p>(2) 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 East Bay campus-specific pattern for the B.S. in Chemistry with option in Forensic Science:

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"> • Courses that articulate with [CSUEB MATH 1304, 1305 and 2304], Calculus I, II & III. <u>And</u> • Courses that articulate with [CSUEB PHYS 2701, 2702, and 2703], Introductory Physics sequence. <u>And</u> • Courses that articulate with [CSUEB BIOL 1401, 1402 and 1403], Cellular, Plant and Animal Biology. 	<p>0-6 units</p> <p>0-4 units</p> <p>0-8 units</p>
(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 East Bay campus-specific pattern for the B.A. in Biochemistry:

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"> • Courses that articulate with [CSUEB BIOL 1401, 1402 and 1403], Cellular, Plant and Animal Biology. <u>And</u> • Courses that articulate with [CSUEB MATH 1304 and 1305], Calculus I & II. <u>And</u> • Courses that articulate with [CSUEB PHYS 2701, 2702, and 2703], Introductory Physics sequence. 	<p>0-8 units</p> <p>0-3 units</p> <p>0-4 units</p>
(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 East Bay campus-specific pattern for the B.S. in Biochemistry:

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"> • Courses that articulate with [CSUEB BIOL 1401, 1402 and 1403], Cellular, Plant and Animal Biology. <u>And</u> • Courses that articulate with [CSUEB MATH 1304, 1305 and 2304], Calculus I, II & III. <u>And</u> • Courses that articulate with [CSUEB PHYS 2701, 2702, and 2703], Introductory Physics sequence. 	<p>0-8 units</p> <p>0-6 units</p> <p>0-4 units</p>
(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

Chemistry and Biochemistry LOWER-DIVISION TRANSFER PATTERN CSU Fresno Campus-Specific Pattern

In addition to the statewide pattern, the following is the CSU Fresno campus-specific pattern for the B.A. in Chemistry:

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 BIOL 1A], Introductory Biology- Thematic intro to the unifying concepts of life science: chemical basis of life; cellular processes; 	0-4 units

energy metabolism; genetics; evolution. <u>And</u>	
<ul style="list-style-type: none"> • A course that articulates with [CSUF BIOL 1B], Introductory Biology- Continuation of thematic introduction the unifying concepts of life science: classification and diversity and diversity of life; survey of the living organisms; physiology; ecology and environmental biology. <u>And</u> • A course that articulates with [CSUF MATH 76], Calculus II. 	<p>0-5 units</p> <p>0-3 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"> • If Physics - Algebra and Trigonometry Based is completed as part of the statewide requirements complete the following: <ul style="list-style-type: none"> ○ A course that articulates with [CSUF PHYS 2B], General Physics - Topics and concepts in light, electricity, magnetism, atomic structure, relativity, quantum nature of light and matter, nuclear structure and radiation. <u>Or</u> • If Physics - Calculus Base I is completed as part of the statewide requirements complete the following: <ul style="list-style-type: none"> ○ A course that articulates with [CSUF PHYS 4B], Electricity, Magnetism, and Heat- Topics in classical physics including heat and thermodynamics, electrostatics, electric fields and potential, currents and AC and DC electric circuits, magnetic fields, electromagnetic induction. <u>And</u> ○ A course that articulates with [CSUF PHYS 4BL], Laboratory in Electricity, Magnetism, and Heat. <u>And</u> ○ A course that articulates with [CSUF PHYS 4C], Light and Modern Physics- Maxwell's Equations, geometrical optics; electromagnetic radiation; physical optics; introduction to special relativity; quantum physics; and the physics of atoms, nuclei, and the solid state. 	<p>0-4 units</p> <p>0-7 units</p>
(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 Fresno campus-specific pattern for the B.S. in Chemistry:

Campus-Specific Pattern	Semester Unit Requirement
<p>(1) If not taken as part of the statewide pattern take <u>all</u> of the following:</p> <ul style="list-style-type: none"> • A course that articulates with [CSUF MATH 76], Calculus II. <u>And</u> • A course that articulates with [CSUF MATH 77], Calculus III. <u>And</u> • A course that articulates with [CSUF PHYS 4AL], Laboratory in Mechanics and Wave Motion. <u>And</u> • A course that articulates with [CSUF PHYS 4B], Electricity Magnetism, and Heat. <u>And</u> • A course that articulates with [CSUF PHYS 4BL], Laboratory in Electricity, Magnetism, and Heat. <u>And</u> • A course that articulates with [CSUF PHYS 4C], Light and Modern Physics. 	<p>0-4 units</p> <p>0-4 units</p> <p>0-1 unit</p> <p>0-3 units</p> <p>0-1 unit</p> <p>0-3 units</p>
(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

Chemistry and Biochemistry 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
(1) If necessary, complete additional coursework to bring total to 60 transferable semester units.

**Chemistry and Biochemistry
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 a B.A. in Chemistry:

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 CHEM 109], General Chemistry. <u>And</u> • A course that articulates with [HSU CHEM 110], General Chemistry. 	0-5 units 0-5 units
(2) If not taken as part of the statewide pattern complete <u>one</u> of the following calculus series: <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 MATH 105], Calculus for the Biological Sciences and Natural Resources. <u>And</u> ○ A course that articulates with [HSU MATH 205], Multivariate Calculus for the Biological Sciences and Natural Resources. <u>Or</u> • Complete <u>all</u> of the following: <ul style="list-style-type: none"> ○ A course that articulates with [HSU MATH 109], Calculus I. <u>And</u> ○ A course that articulates with [HSU MATH 110], Calculus II. <u>And</u> ○ A course that articulates with [HSU MATH 210], Calculus III. 	0-12 units
(3) If not taken as part of the statewide pattern complete <u>one</u> of the following physics series: <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 Physics: Mechanics and Heat. <u>And</u> ○ A course that articulates with [HSU PHYX 107], College Physics: Electromagnetism and 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 and Heat. <u>And</u> ○ A course that articulates with [HSU PHYX 111], General Physics III: Optics and Modern Physics. 	0-12 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 a B.A. in Chemistry, Chemical Technology Option:

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 CHEM 109], General Chemistry. <u>And</u> • A course that articulates with [HSU CHEM 110], General Chemistry. <u>And</u> • A course that articulates with [HSU BIOL 105], Principles of Biology. <u>And</u> • A course that articulates with [HSU BIOM 109], Introductory Biometrics. 	0-5 units 0-5 units 0-4 units 0-4 units
(2) If not taken as part of the statewide pattern complete <u>one</u> of the following calculus series: <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 MATH 105], Calculus for the Biological Sciences and Natural Resources. <u>And</u> ○ A course that articulates with [HSU MATH 205], Multivariate Calculus for the Biological Sciences and Natural Resources. <u>Or</u> • Complete <u>all</u> of the following: 	0-12 units

<ul style="list-style-type: none"> ○ A course that articulates with [HSU MATH 109], Calculus I. <u>And</u> ○ A course that articulates with [HSU MATH 110], Calculus II. <u>And</u> ○ A course that articulates with [HSU MATH 210], Calculus III. 	
(3) If not taken as part of the statewide pattern complete <u>one</u> of the following physics series: <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 Physics: Mechanics and Heat. <u>And</u> ○ A course that articulates with [HSU PHYX 107], College Physics: Electromagnetism and 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 and Heat. <u>And</u> ○ A course that articulates with [HSU PHYX 111], General Physics III: Optics and Modern Physics. 	0-12 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 a B.S. in Chemistry:

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 CHEM 109], General Chemistry. <u>And</u> • A course that articulates with [HSU CHEM 110], General Chemistry. <u>And</u> • A course that articulates with [HSU MATH 109], Calculus I. <u>And</u> • A course that articulates with [HSU MATH 110], Calculus II. <u>And</u> • A course that articulates with [HSU MATH 210], Calculus III. <u>And</u> • A course that articulates with [HSU MATH 241], Elements of Linear Algebra. <u>And</u> • 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 and Heat. <u>And</u> • A course that articulates with [HSU PHYX 111], General Physics III: Optics and Modern Physics. 	0-5 units 0-5 units 0-4 units 0-4 units 0-4 units 0-4 units 0-4 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 Humboldt State University campus-specific pattern for a B.S. in Chemistry, Biochemistry option:

Campus-Specific Pattern	Semester Unit Requirement
(1) 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 [HSU BOT 105], General Botany. <u>Or</u> • A course that articulates with [HSU ZOOL 110], Introductory Zoology. 	0-5 units
(2) 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 CHEM 109], General Chemistry. <u>And</u> • A course that articulates with [HSU CHEM 110], General Chemistry. <u>And</u> • A course that articulates with [HSU MATH 109], Calculus I. <u>And</u> • A course that articulates with [HSU MATH 110], Calculus II. <u>And</u> • A course that articulates with [HSU MATH 210], Calculus III. <u>And</u> • A course that articulates with [HSU MATH 241], Elements of Linear Algebra. <u>And</u> • A course that articulates with [HSU PHYX 109], General Physics I: Mechanics. 	0-4 units 0-5 units 0-5 units 0-4 units 0-4 units 0-4 units 0-4 units 0-4 units

<ul style="list-style-type: none"> • <u>And</u> • A course that articulates with [HSU PHYX 110], General Physics II: Electricity and Heat. <u>And</u> • A course that articulates with [HSU PHYX 111], General Physics III: Optics and Modern Physics. 	0-4 units
	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 Humboldt State University campus-specific pattern for a B.S. in Chemistry, Environmental Toxicology option:

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 ZOO 110], Introductory Zoology. <u>And</u> • A course that articulates with [HSU BIOM 109], Introductory Biometrics. <i>Courses other than BIOM 109 may be considered. Please contact the department directly at (707) 826-3277. <u>And</u></i> • A course that articulates with [HSU CHEM 109], General Chemistry. <u>And</u> • A course that articulates with [HSU CHEM 110], General Chemistry. <u>And</u> • A course that articulates with [HSU MATH 109], Calculus I. <u>And</u> • A course that articulates with [HSU MATH 110], Calculus II. <u>And</u> • A course that articulates with [HSU MATH 210], Calculus III. <u>And</u> • A course that articulates with [HSU MATH 241], Elements of Linear Algebra. <u>And</u> • 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 and Heat. <u>And</u> • A course that articulates with [HSU PHYX 111], General Physics III: Optics and Modern Physics. 	0-4 units 0-4 units 0-4 units 0-5 units 0-5 units 0-4 units 0-4 units 0-4 units 0-4 units 0-4 units
(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

Chemistry and Biochemistry 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.A. in Chemistry:

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 [CSULB MATH 123], Calculus II. 	0-5 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 [CSULB PHYS 152], Electricity and Magnetism. <u>Or</u> • A course that articulates with [CSULB PHYS 100B], General Physics. 	0-5 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 CSU Long Beach campus-specific pattern for the B.S. in Chemistry:

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 PHYS 152], Electricity and Magnetism. 	0-5 units 0-5 units
(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.	
<u>One of the following is strongly recommended:</u>	
<ul style="list-style-type: none"> • <u>Both</u> of the following: <ul style="list-style-type: none"> • A course that articulates with [CSULB BIOL 111 & 111L], Evolution and Diversity and Evolution and Diversity Laboratory. <u>and</u> • A course that articulates with [CSULB BIOL 212 & 212L], Cell and Molecular Biology and Laboratory. <u>Or</u> • A course that articulates with [CSULB BIOL 200], General Biology. <u>Or</u> • A course that articulates with [CSULB BIOL 205], Human Biology. <u>Or</u> • A course that articulates with [CSULB BIOL 207], Human Physiology. 	

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

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 [CSULB MATH 123], Calculus II. 	0-5 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 [CSULB PHYS 152], Electricity and Magnetism. <u>Or</u> • A course that articulates with [CSULB PHYS 100B] General Physics. 	0-5 units
(3) If necessary, complete additional coursework to bring total to 60 transferable semester units.	
<u>The following courses are strongly recommended:</u>	
<ul style="list-style-type: none"> • Courses that articulate with [CSULB BIOL 111 + 111L], Evolution and Diversity and Laboratory. <u>And</u> • Courses that articulate with [CSULB BIOL 212 + 212L], Introduction to Cell and Molecular Biology and Laboratory. 	

Chemistry and Biochemistry 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.A. in Chemistry:

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"> • Courses that articulate with [CSULA PHYS 101, 102, & 103], two semesters of Physics (Algebra/Trig based). <u>And</u> • Courses that articulate with [CSULA MATH 206, 207, & 208], two semesters of Calculus. <u>And</u> • A course that articulates with, a second semester of expository writing that emphasizes exposition, research, and critical thinking, typically called "Writing and Critical Thinking" (as opposed to "Literature and Composition".) 	0-8 units 0-8 units 0-3 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 Los Angeles campus-specific pattern for the B.S. in Chemistry:

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"> • Courses that articulate with [CSULA PHYS 211, 212, 213 & 214], three semesters of Physics (Calculus based). <u>And</u> • Courses that articulate with [CSULA MATH 206, 207, 208 & 209], three semesters of Calculus. <u>And</u> • A course that articulates with, a second semester of expository writing that emphasizes exposition, research, and critical thinking, typically called “Writing and Critical Thinking” (as opposed to “Literature and Composition”). 	0-13 units 0-12 units 0-3 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 Los Angeles campus-specific pattern for the B.S. in Biochemistry:

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"> • Courses that articulate with [CSULA PHYS 211, 212 & 213], two semesters of Physics (Calculus based). <u>And</u> • Courses that articulate with [CSULA MATH 206, 207, 208 & 209], three semesters of Calculus. <u>And</u> • A course that articulates with, a second semester of expository writing that emphasizes exposition, research, and critical thinking, typically called “Writing and Critical Thinking” (as opposed to “Literature and Composition”). 	0-10 units 0-12 units 0-3 units
(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

**Chemistry and Biochemistry
LOWER-DIVISION TRANSFER PATTERN
California Maritime Academy Campus-Specific Pattern**

This campus does not have a major, concentration, or option in Chemistry and Biochemistry.

**Chemistry and Biochemistry
LOWER-DIVISION TRANSFER PATTERN
CSU Monterey Bay Campus-Specific Pattern**

This campus does not have a major, concentration, or option in Chemistry and Biochemistry.

**Chemistry and Biochemistry
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.A. in Chemistry or the B.S. in Chemistry:

Campus-Specific Pattern	
(1) If not taken as part of the statewide pattern complete the following:	
<ul style="list-style-type: none"> • A course that articulate with [CSUN MATH 150B], Calculus II. 	0-5 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 Northridge campus-specific pattern for the B.S. in Biochemistry:

Campus-Specific Pattern	
(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 articulate with [CSUN MATH 150B], Calculus II. <u>And</u> • A course that articulate with [CSUN BIOL 106/L], Biological Principles I and Lab. <li style="padding-left: 20px;"><u>And</u> • A course that articulate with [CSUN BIOL 107/L], Biological Principles II 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.	

**Chemistry and Biochemistry
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 Chemistry:

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"> • Courses that articulate with [CPP PHY 131/131L, PHY 132/132L and PHY 133/133L], two semesters of Physics (Calculus based). <u>And</u> • Courses that articulate with [CPP MAT 114, MAT 115, and MAT 116], two semesters of Calculus. 	0-5 units
	0-5 units
(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

**Chemistry and Biochemistry
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
(1) If necessary, complete additional coursework to bring total to 60 transferable semester units.

**Chemistry and Biochemistry
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:

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], General Physics I. <u>And</u> • A course that articulates with [CSUSB PHYS 222], General Physics II. <u>And</u> • A course that articulates with [CSUSB PHYS 223], General Physics III. <u>And</u> • A course that articulates with [CSUSB MATH 211], Basic Concepts of Calculus. <u>And</u> • A course that articulates with [CSUSB MATH 212], Calculus II. <u>And</u> • A course that articulates with [CSUSB MATH 213], Calculus III. 	0-3 units 0-3 units 0-3 units 0-3 units 0-3 units 0-3 units
(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

**Chemistry and Biochemistry
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 PHYS 195 & 195L], 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 & 196L], Principles of Physics - Fundamental principles of physics in areas of electricity and magnetism. Designed for students requiring calculus-based physics. <u>And</u> • A course that articulates with [SDSU MATH 151], Calculus II - 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 MATH 252], Calculus III - Functions of several variables. Vectors. Partial derivatives and multiple integrals. Line integrals and Green's Theorem. <u>And</u> • A course that articulates with [SDSU CHEM 231], Organic Chemistry - Properties and synthesis of organic compounds including reaction mechanisms. <u>And</u> • A course that articulates with [SDSU CHEM 251], Analytical Chemistry - Introduction to the theory and practice of analytical chemistry including gravimetric, volumetric, and instrumental methods. 	0-4 units 0-4 units 0-4 units 0-4 units 0-4 units 0-5 units
(2) Students must complete 60 (but not more than 70) transferable semester units. Coursework not taken at the community college must be completed at SDSU.	

**Chemistry and Biochemistry
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 Chemistry:

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 [SFSU PHYS 111/112], General Physics I with Lab - Mechanics, heat, and sound using algebra and trigonometry. <u>And</u> • A course that articulates with [SFSU ENG 114], College Composition, 1st semester - Training in expository- argumentative composition, emphasizing work on clear and effective sentences and the organization and development of paragraph and essay. <u>And</u> • A course that articulates with [SFSU ENG 214], College Composition and Literature, 2nd semester - Expository- argumentative composition and critical reading skills through the study of literature; special attention to logic, style, and rhetoric. <u>And</u> • A course that articulates with [SFSU MATH 227], Calculus II - Techniques of integration, analytic geometry, polar coordinates, vectors, improper integrals, vector calculus. <u>And</u> • A course that articulates with [SFSU PHYS 121/122], General Physics II with Lab - Light, electricity, magnetism, atoms, and modern physics. <p><i>A minimum grade of C is necessary in courses used to meet these requirements.</i></p>	<p>0-4 units</p> <p>0-3 units</p> <p>0-3 units</p> <p>0-4 units</p> <p>0-4 units</p>
(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 Biochemistry:

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 [SFSU BIOL 230], Introductory Biology I, for majors - Cell and molecular biology, genetics, bioenergetics, physiology. <u>And</u> • A course that articulates with [SFSU ENG 114], College Composition, 1st semester - Training in expository- argumentative composition, emphasizing work on clear and effective sentences and the organization and development of paragraph and essay. <u>And</u> • A course that articulates with [SFSU ENG 214], College Composition and Literature, 2nd semester - Expository- argumentative composition and critical reading skills through the study of literature; special attention to logic, style, and rhetoric. <u>And</u> • A course that articulates with [SFSU MATH 227], Calculus II - Techniques of integration, analytic geometry, polar coordinates, vectors, improper integrals, vector calculus. <p><i>A minimum grade of C is necessary in courses used to meet these requirements.</i></p>	<p>0-5 units</p> <p>0-3 units</p> <p>0-3 units</p> <p>0-4 units</p>
<p>(2) If not taken as part of the statewide pattern complete at least <u>one</u> of the following:</p> <ul style="list-style-type: none"> • A course that articulates with [SFSU PHYS 111/112], General Physics I with Lab - Mechanics, heat, and sound using algebra and trigonometry. <u>Or</u> • A course that articulates with [SFSU PHYS 220/222], General Physics with Calculus I and Lab - Basic mechanics where calculus is used in examples and problems. <p><i>A minimum grade of C is necessary in courses used to meet this requirement.</i></p>	0-4 units
<p>(3) If not taken as part of the statewide pattern complete at least <u>one</u> of the following:</p> <ul style="list-style-type: none"> • A course that articulates with [SFSU PHYS 121/122], General Physics II - Light, 	0-4 units

electricity, magnetism, atoms, and modern physics. <u>Or</u> <ul style="list-style-type: none"> • A course that articulates with [SFSU PHYS 240/242], General Physics with Calculus III and Lab - Wave motion, optics and thermodynamics. <i>A minimum grade of C is necessary in courses used to meet this requirement.</i> 	
(4) 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 Chemistry:

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 [SFSU PHYS 220/222], General Physics with Calculus I and Lab - Basic mechanics where calculus is used in examples and problems. <u>And</u> • A course that articulates with [SFSU ENG 114], College Composition, 1st semester - Training in expository- argumentative composition, emphasizing work on clear and effective sentences and the organization and development of paragraph and essay. <u>And</u> • A course that articulates with [SFSU ENG 214], College Composition and Literature, 2nd semester - Expository- argumentative composition and critical reading skills through the study of literature; special attention to logic, style, and rhetoric. <u>And</u> • A course that articulates with [SFSU MATH 227], Calculus II - Techniques of integration, analytic geometry, polar coordinates, vectors, improper integrals, vector calculus. <u>And</u> • A course that articulates with [SFSU MATH 228], Calculus III - Three-dimensional analytic geometry, partial differentiation, multiple integrals, vector calculus. <u>And</u> • A course that articulates with [SFSU PHYS 230/232], General Physics with Calculus II and Lab - Electricity and magnetism. <u>And</u> • A course that articulates with [SFSU PHYS 240/242], General Physics with Calculus III and Lab - Wave motion, optics and thermodynamics. <i>A minimum grade of C is necessary in courses used to meet these requirements.</i> 	<p>0-4 units</p> <p>0-3 units</p> <p>0-3 units</p> <p>0-4 units</p> <p>0-4 units</p> <p>0-4 units</p> <p>0-4 units</p>
(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

Chemistry and Biochemistry 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.A. in Chemistry; the B.A. in Chemistry, Preparation for Teaching; and the B.S. in Chemistry, including concentrations in Materials Science and Biochemistry:

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"> • Courses that articulates with [SJSU CHEM 0001A & CHEM 001B], General Chemistry (<i>sequence must be taken at the same school</i>). <u>And</u> • A course that articulates with [SJSU CHEM 055], Quantitative Analysis. <u>And</u> • A course that articulates with [SJSU ENGL 001B], Composition 2, or an equivalent 2nd Semester English Composition course approved for IGETC Area 1B. <u>And</u> • Physical Activity. <i>Two units taken in at least two different activities.</i> <i>A minimum grade of C or higher is required in courses used to meet these requirements.</i> 	<p>0-10 units</p> <p>0-3 units</p> <p>0-3 units</p> <p>0-2 units</p>
(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

**Chemistry and Biochemistry
LOWER-DIVISION TRANSFER PATTERN
Cal Poly San Luis Obispo Campus-Specific Pattern**

In addition to the statewide pattern, the following is the Cal Poly San Luis Obispo 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"> • Courses that articulate with two semesters of (Algebra/Trig based) Physics: <ul style="list-style-type: none"> ○ A course that articulates with [SLO PHYS 141], General Physics IA. <u>And</u> ○ A course that articulates with [SLO PHYS 132], General Physics II. <u>And</u> ○ A course that articulates with [SLO PHYS 133], General Physics III. • Courses that articulate with two semesters of Calculus: <ul style="list-style-type: none"> ○ A course that articulates with [SLO MATH 141], Calculus I. <u>And</u> ○ A course that articulates with [SLO MATH 142], Calculus II. <u>And</u> ○ A course that articulates with [SLO MATH 143], Calculus III. <u>And</u> ○ A course that articulates with [SLO MATH 241], Calculus IV. 	0-3 units 0-3 units 0-3 units 0-3 units 0-3 units 0-3 units 0-3 units
(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

**Chemistry and Biochemistry
LOWER-DIVISION TRANSFER PATTERN
CSU San Marcos Campus-Specific Pattern**

In addition to the statewide pattern, the following is the CSU San Marcos campus-specific pattern:

Campus-Specific Pattern
(1) If necessary, complete additional coursework to bring total to 60 transferable semester units.

**Chemistry and Biochemistry
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
(1) If not taken as part of the statewide pattern, complete the following: <ul style="list-style-type: none"> • A course that articulates with [CAN MATH 20], Second semester Calculus. 	0-5 units
(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

**Chemistry and Biochemistry
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
(1) If necessary, complete additional coursework to bring total to 60 transferable semester units.

