

## Mathematics

### 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 Mathematics at any CSU campus offering the major includes:

- Completion of most 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 in (3) and (4) below.

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><b>(1) Complete lower-division general education requirements.</b>  <i>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 pattern stated below.</i></p> <p><u>A course used to satisfy CSU GE Breadth AREA B1 or IGETC AREA 5A is identified within the campus-specific requirements.</u></p> <p><i>A minimum grade of C is required in courses used to meet CSU GE Breadth AREAS A and B4.</i>  <i>A minimum grade of C is required in each course used for IGETC.</i></p>	<p><b>39 units for CSU GE Breadth</b>  <i>or</i>  <b>37 units for IGETC</b></p>
<p><b>(2) Complete the graduation requirements in United States History, Constitution, and American Ideals.</b></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><b>0-6 units</b></p>
<p><b>(3) Complete the Single Variable Calculus sequence, [CAN MATH SEQ B].</b></p> <p><i>One course used to meet the requirements may be used to satisfy GE-Breadth AREA B4 or IGETC AREA 2.</i></p>	<p><b>4-8 units</b></p>
<p><b>(4) Complete Multivariable Calculus, [CAN MATH 22].</b></p>	<p><b>4 units</b></p>
<p><b>Total Semester Units Required for Statewide LDTP Pattern</b></p>	<p><b>45-57 units</b></p>

**Mathematics**  
**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 Mathematics:

Campus-Specific Pattern	Semester Unit Requirement
<b>(1) If not taken as part of the statewide pattern complete <u>all</u> of the following:</b> <ul style="list-style-type: none"> <li>• <b>A course that articulates with [CSUB MATH 201], Calculus I</b> - Introduction to the differential calculus of elementary functions (including logarithmic, exponential, and trigonometric functions). <u>And</u></li> <li>• <b>A course that articulates with [CSUB MATH 202], Calculus II</b> - Introduction to the integral calculus of elementary functions. <u>And</u></li> <li>• <b>A course that articulates with [CSUB MATH 203], Calculus III</b> - Three dimensional analytic geometry; polar coordinates; parametric curves; functions of several variables; partial and directional derivatives; the chain rule; gradients; optimization. <u>And</u></li> <li>• <b>A course that articulates with [CSUB MATH 204], Calculus IV</b> - Separable differential equations; cylindrical and spherical coordinates; double integrals; triple integrals; vector calculus, including line and surface integrals, the Fundamental Theorem of Line Integrals, and the theorems of Green, Stokes, and Gauss; selected topics. <u>And</u></li> <li>• <b>A course that articulates with [CSUB MATH 205], Ordinary Differential Equations</b> - First-order differential equations; linear differential equations; linear systems. <u>And</u></li> <li>• <b>A course that articulates with [CSUB MATH 222], Laboratory Experience</b> - An introduction to the use of a computer algebra system in exploring applications in differential and integral calculus. <u>And</u></li> <li>• <b>A course that articulates with [CSUB CMPS 221], Programming Fundamentals</b> - Introduces the fundamentals of procedural programming.</li> </ul>	<b>0-4 units</b>  <b>0-4 units</b>  <b>0-4 units</b>  <b>0-4 units</b>  <b>0-4 units</b>  <b>0-2 units</b>  <b>0-4 units</b>
<b>(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.</b>	

**Mathematics**  
**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:

Campus-Specific Pattern	Semester Unit Requirement
<b>(1) If not taken as part of the statewide pattern, complete <u>all</u> of the following:</b> <ul style="list-style-type: none"> <li>• <b>Coursework that articulates with [CSUCI PHYS 200], General Physics I (Calculus-based).</b> <u>And</u></li> <li>• <b>Coursework that articulates with [CSUCI MATH 230], Logic and Mathematical Thinking.</b> <u>And</u></li> <li>• <b>Coursework that articulates with [CSUCI MATH 240], Linear Algebra.</b></li> </ul>	<b>0-4 units</b>  <b>0-3 units</b>  <b>0-3 units</b>
<b>(2) If not taken as part of the statewide pattern complete at least <u>one</u> of the following:</b> <ul style="list-style-type: none"> <li>• <b>Coursework that articulates with [CSUCI COMP 221], Introduction to UNIX and C for Programmers.</b> <u>Or</u></li> <li>• <b>Coursework in Programming in the C++ Language.</b> <u>Or</u></li> <li>• <b>Coursework that articulates with [CSUCI COMP 151], Data Structures and Program Design.</b></li> </ul>	<b>0-3 units</b>
<b>(3) If necessary, complete additional coursework to bring total to 60 transferable semester units.</b>	

**Mathematics**  
**LOWER-DIVISION TRANSFER PATTERN**  
**CSU Chico Campus-Specific Pattern**

In addition to the statewide pattern, the following is the CSU Chico campus-specific pattern in Mathematics with an option in General and Applied Mathematics option or Mathematics Education 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"> <li>• A course that fulfills CSU GE Breadth Area B1, Physical Science. <u>And</u></li> <li>• A course that articulates with [CSUC MATH 260] Elementary Differential Equations.</li> </ul>	0-3 units 0-3 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"> <li>• A course that articulates with [CSUC CSCI 110], Introduction to Applications Programming. <u>Or</u></li> <li>• A course that articulates with [CSUC CSCI 111], Programming and Algorithms I. <u>Or</u></li> <li>• A course that articulates with [CSUC CSCI 144], Introduction to UNIX Operating System.</li> </ul>	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 CSU Chico campus-specific pattern in Mathematics with an option in Statistics:

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"> <li>• A course that fulfills CSU GE Breadth Area B1, Physical Science.</li> </ul>	0-3 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"> <li>• A course that articulates with [CSUC CSCI 110], Introduction to Applications Programming. <u>Or</u></li> <li>• A course that articulates with [CSUC CSCI 111], Programming and Algorithms I. <u>Or</u></li> <li>• A course that articulates with [CSUC CSCI 144], Introduction to UNIX Operating System.</li> </ul>	0-3 units
(3) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

**Mathematics**  
**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 Mathematics Option:

Campus-Specific Pattern	Semester Unit Requirement
(1) If not taken as part as the statewide pattern complete <u>all</u> of the following: <ul style="list-style-type: none"> <li>• A course that articulates with [CSUDH PHY 130], General Physics I (Calculus-based). <u>And</u></li> <li>• A course that articulates with [CSUDH PHY 132], General Physics II (Calculus-based). <u>And</u></li> <li>• A course that articulates with [CSUDH CSC 121], Introduction to Computer Science and Programming I.</li> </ul>	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 CSU Dominguez Hills campus-specific pattern for the Mathematics Education 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"> <li>• A course that articulates with [CSUDH PHY 130], General Physics I (Calculus-based). <u>And</u></li> <li>• A course that articulates with [CSUDH PHY 132], General Physics II (Calculus-based). <u>And</u></li> <li>• A course that articulates with [CSUDH MAT 131], Introduction to Statistics.</li> </ul>	0-4 units 0-4 units 0-3 units
(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

## Mathematics 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.S. in Mathematics:

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"> <li>• A course that articulates with [CSUEB MATH 2101], Elements of Linear Algebra. <u>And</u></li> <li>• A course that articulates with [CSUEB MATH 2150], Discrete Structures. <u>And</u></li> <li>• A course that articulates with [CSUEB CS 1160], Introduction to Computer Science and Programming Methods. <u>And</u></li> <li>• A physical science course that satisfies CSU GE Breadth Area B1 or IGETC Area 5A.</li> </ul>	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.	

## Mathematics 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 Mathematics:

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"> <li>• A course that articulates with [CSUF CSCI 40], Introduction to Programming and Problem Solving. <u>And</u></li> <li>• A course that articulates with [CSUF MATH 81], Applied Analysis- Introduction to ordinary linear differential equations and linear systems of differential equations; solutions by Laplace transforms. Solution of linear systems of equations; intro to vector spaces; eigenvalues and eigenvectors. <u>And</u></li> <li>• A course that articulates with [CSUF PHYS 4A], Mechanics and Wave Motion.</li> </ul>	0-3 units 0-3 units 0-3 units
(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

**Mathematics**  
**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
(1) If not taken as part of the statewide pattern complete <u>all</u> of the following: <ul style="list-style-type: none"> <li>• A course that articulates with [CSUF MATH 250B], <b>Introduction to Linear Algebra and Differential Equations</b> - A course that introduces the solutions of ordinary differential equations and their relationship to linear algebra. <u>And</u></li> <li>• A course that articulates with <b>CSU GE Breadth Area B1, Physical Science.</b></li> </ul>	0-4 units  0-3 units
(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

**Mathematics**  
**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:

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"> <li>• A course that articulates with [HSU MATH 240], <b>Introduction to Mathematical Thought.</b> <u>And</u></li> <li>• A course that articulates with [HSU MATH 241], <b>Elements of Linear Algebra.</b></li> <li>• A course that articulates with <b>CSU GE Breadth Area B1, Physical Science.</b></li> </ul>	0-3 units 0-4 units  0-3 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"> <li>• A course that articulates with [HSU CS 131], <b>Introduction to Computer Science.</b></li> <li><u>Or</u></li> <li>• Complete <u>both</u> of the following:               <ul style="list-style-type: none"> <li>○ A course that articulates with [HSU CIS 130], <b>Introduction to Programming.</b></li> <li><u>And</u></li> <li>○ A course that articulates with [HSU CIS 230], <b>C++ Programming.</b></li> </ul> </li> </ul>	0-6 units
(3) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

**Mathematics**  
**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 Mathematics for the Pure Mathematics 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"> <li>• A course that articulates with [CSULB MATH 247], <b>Introduction to Linear Algebra.</b> <u>And</u></li> <li>• A course that articulates with [CSULB CECS 174], <b>Programming and Problem Solving I.</b> <u>And</u></li> <li>• A course that articulates with [CSULB PHYS 151], <b>Mechanics and Heat.</b></li> </ul>	3 units  3 units  4 units
(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

<p><u>Recommended courses:</u></p> <ul style="list-style-type: none"> <li>• A course in <i>Differential Equations</i>.</li> <li>• Students wishing to transfer to CSULB to major in math should complete as much of the calculus sequence as possible before transfer [CSULB MATH 122, 123, 224 or equivalent].</li> </ul>
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In addition to the statewide pattern, the following is the CSU Long Beach campus-specific pattern for the B.S. in Mathematics, Option in Applied Mathematics: Sub-option 1. Area of application in science and engineering:

Campus-Specific Pattern	Semester Unit Requirement
<p><b>(1) If not taken as part of the statewide pattern, complete <u>all</u> of the following:</b></p> <ul style="list-style-type: none"> <li>• A course that articulates with [CSULB MATH 247], <b>Introduction to Linear Algebra.</b> <u>And</u></li> <li>• A course that articulates with [CSULB CECS 174], <b>Programming and Problem Solving I.</b> <u>And</u></li> <li>• A course that articulates with [CSULB PHYS 151], <b>Mechanics and Heat.</b> <u>And</u></li> <li>• A course that articulates with [CSULB PHYS 152], <b>Electricity and Magnetism.</b></li> </ul>	<p><b>0-3 units</b></p> <p><b>0-3 units</b></p> <p><b>0-4 units</b></p> <p><b>0-4 units</b></p>
<p><b>(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.</b></p> <p><u>Recommended courses:</u></p> <ul style="list-style-type: none"> <li>• A course in <i>Differential Equations</i>.</li> <li>• Students wishing to transfer to CSULB to major in math should complete as much of the calculus sequence as possible before transfer [CSULB MATH 122, 123, 224 or equivalent].</li> </ul>	

In addition to the statewide pattern, the following is the CSU Long Beach campus-specific pattern for the B.S. in Mathematics, Option in Applied Mathematics: Sub-option 2. Area of application in economics and management:

Campus-Specific Pattern	Semester Unit Requirement
<p><b>(1) If not taken as part of the statewide pattern, complete <u>all</u> of the following:</b></p> <ul style="list-style-type: none"> <li>• A course that articulates with [CSULB MATH 247], <b>Introduction to Linear Algebra.</b> <u>And</u></li> <li>• A course that articulates with [CSULB CECS 174], <b>Programming and Problem Solving I.</b> <u>And</u></li> <li>• A course that articulates with [CSULB ECON 100], <b>Principles of Macroeconomics.</b> <u>And</u></li> <li>• A course that articulates with [CSULB ECON 101], <b>Principles of Microeconomics.</b></li> </ul>	<p><b>0-3 units</b></p> <p><b>0-3 units</b></p> <p><b>0-3 units</b></p> <p><b>0-3 units</b></p>
<p><b>(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.</b></p> <p><u>Recommended courses:</u></p> <ul style="list-style-type: none"> <li>• A course in <i>Differential Equations</i>.</li> <li>• Students wishing to transfer to CSULB to major in math should complete as much of the calculus sequence as possible before transfer [CSULB MATH 122, 123, 224 or equivalent].</li> </ul>	

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

Campus-Specific Pattern	Semester Unit Requirement
<p><b>(1) If not taken as part of the statewide pattern, complete <u>all</u> of the following:</b></p> <ul style="list-style-type: none"> <li>• A course that articulates with [CSULB MATH 247], <b>Introduction to Linear Algebra.</b> <u>And</u></li> <li>• A course that articulates with [CSULB CECS 174], <b>Programming and Problem Solving I.</b></li> </ul>	<p><b>0-3 units</b></p> <p><b>0-3 units</b></p>
<p><b>(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.</b></p> <p><u>Recommended courses:</u></p> <ul style="list-style-type: none"> <li>• Students wishing to transfer to CSULB to major in math should complete as much of the calculus sequence</li> </ul>	

as possible before transfer [CSULB MATH 122, 123, 224 or equivalent].

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

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"> <li>• A course that articulates with [CSULB MATH 247], Introduction to Linear Algebra.</li> </ul>	0-3 units
(2) If not taken as part of the statewide pattern, complete <u>one</u> of the following sequences: <ul style="list-style-type: none"> <li>• Complete <u>all</u> of the following:               <ul style="list-style-type: none"> <li>○ A course that articulates with [CSULB PHYS 151], Mechanics and Heat. <u>And</u></li> <li>○ A course that articulates with [CSULB PHYS 152], Electricity and Magnetism.</li> </ul> </li> <li>• Complete <u>all</u> of the following:               <ul style="list-style-type: none"> <li>○ A course that articulates with [CSULB PHIL 170], Critical Reasoning. <u>And</u></li> <li>○ A course that articulates with [CSULB PHIL 270], Symbolic Logic.</li> </ul> </li> <li>• Complete the following:               <ul style="list-style-type: none"> <li>○ Courses that articulate with one year in any one Foreign Language.</li> </ul> </li> </ul>	0-8 units
(3) If necessary, complete additional coursework to bring total to 60 transferable semester units.	
<i>Recommended courses:</i>	
<ul style="list-style-type: none"> <li>• A course in Differential Equations.</li> <li>• Students wishing to transfer to CSULB to major in math should complete as much of the calculus sequence as possible before transfer [CSULB MATH 122, 123, 224 or equivalent].</li> </ul>	

## Mathematics 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 Mathematics:

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"> <li>• A course that articulates with [CSULA 211], Mechanics. <u>And</u></li> <li>• A course that articulates with [CSULA MATH 255], Linear Algebra. <u>And</u></li> <li>• A course that articulates with [CSULA MATH 109], Statistics. <u>And</u></li> <li>• A course that articulates with [CSULA CS 201], A course in object oriented programming.</li> </ul>	0-3 units 0-3 units 0-3 units 0-3 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"> <li>• A course that articulates with [CSULA MATH 248], Discrete Mathematics. <u>Or</u></li> <li>• A course that articulates with [CSULA MATH 215], Differential Equations. <u>Or</u></li> <li>• 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").</li> </ul>	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 CSU Los Angeles campus-specific pattern for the B.S. in Mathematics:

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"> <li>• A course that articulates with [CSULA 211], <b>Mechanics</b>. <u>And</u></li> <li>• A course that articulates with [CSULA MATH 255], <b>Linear Algebra</b>. <u>And</u></li> <li>• A course that articulates with [CSULA MATH 109], <b>Statistics</b>. <u>And</u></li> <li>• A course that articulates with [CSULA CS 201], <b>A course in object oriented programming</b>. <u>And</u></li> <li>• A course that articulates with [CSULA MATH 215], <b>Differential Equations</b>.</li> </ul>	0-3 units 0-3 units 0-3 units 0-3 units 0-3 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"> <li>• A course that articulates with [CSULA MATH 248], <b>Discrete Mathematics</b>. <u>Or</u></li> <li>• A course that articulates with, <b>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”)</b>.</li> </ul>	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 CSU Los Angeles campus-specific pattern for the B.A. in Mathematics with the intention of acquiring the Single Subject Credential in Mathematics:

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"> <li>• A course that articulates with [CSULA 211], <b>Mechanics</b>. <u>And</u></li> <li>• A course that articulates with [CSULA MATH 255], <b>Linear Algebra</b>. <u>And</u></li> <li>• A course that articulates with [CSULA MATH 109], <b>Statistics</b>. <u>And</u></li> <li>• A course that articulates with [CSULA CS 201], <b>A course in object oriented programming</b>.</li> </ul>	0-3 units 0-3 units 0-3 units 0-3 units 0-3 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"> <li>• A course that articulates with [CSULA MATH 248], <b>Discrete Mathematics</b>. <u>Or</u></li> <li>• A course that articulates with, <b>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”)</b>.</li> </ul>	0-3 units
(3) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

**Mathematics**  
**LOWER-DIVISION TRANSFER PATTERN**  
**California Maritime Academy Campus-Specific Pattern**

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

**Mathematics**  
**LOWER-DIVISION TRANSFER PATTERN**  
**CSU Monterey Bay Campus-Specific Pattern**

In addition to the statewide pattern, the following is the CSU Monterey Bay 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"> <li>• A course that articulates with [CSUMB MATH 170], <b>Discrete Mathematics - A course that covers sets and sequences, elementary logic, relations, induction, counting principles, discrete probability, Boolean algebra, logic networks, matrices,</b></li> </ul>	0-3 units

graph theory, and trees.	
<b>(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.</b>	
<i>Recommended foreign language coursework:</i>	
<i>Students transferring into Mathematics at CSUMB are encouraged to begin or complete their language study. (At CSUMB, one upper division requirement for all students is intermediate proficiency in a language). For students who begin but do not complete their language requirement prior to transferring, the following languages are offered at CSUMB: American Sign Language, Italian, Japanese, and Spanish. In addition, French can be completed at a nearby community college.</i>	

**Mathematics  
LOWER-DIVISION TRANSFER PATTERN  
CSU Northridge Campus-Specific Pattern**

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

Campus-Specific Pattern	Semester Unit Requirement
<b>(1) If not taken as part of the statewide pattern complete <u>all</u> of the following:</b>	
<ul style="list-style-type: none"> <li>• A course that articulates with [CSUN MATH 262], Introduction to Linear Algebra.</li> </ul> <p style="text-align: center;"><u>And</u></p> <ul style="list-style-type: none"> <li>• A course that articulates with [CSUN, PHYS 220A/AL], Mechanics and Lab.</li> </ul>	<b>0-3 units</b>
<b>(2) If not taken as part of the statewide pattern complete <u>one</u> of the following:</b>	<b>0-4 units</b>
<ul style="list-style-type: none"> <li>• A course that articulates with [CSUN COMP 106/L], Computing in Engineering and Science and Lab. <u>Or</u></li> <li>• A course that articulates with [CSUN COMP 110/L], Introduction to Algorithms and Programming and Lab.</li> </ul>	
<b>(3) If necessary, complete additional coursework to bring total to 60 transferable semester units.</b>	
<i>Recommended Coursework:</i>	
<ul style="list-style-type: none"> <li>• A course that articulates with [CSUN, PHIL 230], Introduction to Formal Logic. This course is a requirement in the Option in Secondary Teaching. Students in other options are encouraged to complete this course to satisfy CSUN GE Critical Thinking.</li> </ul>	

**Mathematics  
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:

Campus-Specific Pattern	Semester Unit Requirement
<b>(1) If not taken as part of the statewide pattern complete the following:</b>	
<ul style="list-style-type: none"> <li>• A course that articulates with CSU GE Breadth Area B1, Physical Science.</li> </ul>	<b>0-3 units</b>
<b>(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.</b>	

**Mathematics**  
**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 <u>all</u> of the following: <ul style="list-style-type: none"> <li>• A course that articulates with [CSUS MATH 35], <b>Linear Algebra</b>. <u>And</u></li> <li>• A course that articulates with [CSUS MATH 45], <b>Differential Equations</b>. <u>And</u></li> <li>• A course that articulates with <b>CSU GE Breadth Area B1, Physical Science</b>.</li> </ul>	0-3 units 0-3 units 0-3 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"> <li>• A course that articulates with [CSUS CSC 22], <b>Visual Programming in BASIC</b>. <u>Or</u></li> <li>• A course that articulates with [CSUS CSC 15], <b>Programming Concepts and Methodology I</b>. <u>Or</u></li> <li>• A course that articulates with [CSUS CSC 25], <b>Introduction to C Programming</b>.</li> </ul>	0-3 units
(3) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

**Mathematics**  
**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"> <li>• A course that articulates with [CSUSB MATH 270], <b>Differential Equations</b>. <u>And</u></li> <li>• A course that articulates with [CSUSB CSCI 201], <b>Programming Concepts and Methodology I</b>. <u>And</u></li> <li>• A course that articulates with <b>CSU GE Breadth Area B1, Physical Science</b>.</li> </ul>	0-3 units 0-3 units 0-4 units
(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.	

**Mathematics**  
**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 for the B.A. in Math-No Emphasis:

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"> <li>• A course that articulates with [SDSU MATH 254], <b>Introduction to Linear Algebra</b> - Matrix algebra, Gaussian elimination, determinants, vector spaces, linear transformations, orthogonality, eigenvalues, and eigenvectors. <u>And</u></li> <li>• A course that articulates with [SDSU MATH 245], <b>Discrete Mathematics</b> - Logic, methods of proof, set theory, number theory, equivalence and order relations, counting (combinations and permutations), solving recurrence relations. <u>And</u></li> <li>• A course that articulates with [SDSU CS 107], <b>Introduction to Computer Programming</b> - Programming methodology and problem solving. Basic concepts of computer systems, algorithm design and development, data types, program</li> </ul>	0-3 units  0-3 units  0-3 units

<p>structures. Extensive programming in Java. <u>And</u></p> <ul style="list-style-type: none"> <li>• <b>A course that articulates with [SDSU MATH 241], Mathematics Software Workshop</b> - Introduction to mathematical software environment such as MATLAB, MAPLE, MATHEMATICA or the Geometers Sketchpad.</li> </ul>	<b>0-1 unit</b>
<p><b>(2) The Bachelor of Arts in Mathematics is a Liberal Arts and Sciences degree and requires students to meet the following language requirement:</b></p> <ul style="list-style-type: none"> <li>• <b>Competency (successfully completing the third college semester or fifth college quarter - or equivalent) is required in one foreign language.</b></li> </ul>	<b>0-12 units</b>
<p><b>(3) 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.</b></p>	

In addition to the statewide pattern, the following is the San Diego State University campus-specific pattern for the B.A. in Math-Emphasis in Single Subject Teaching Credential:

<b>Campus-Specific Pattern</b>	<b>Semester Unit Requirement</b>
<p><b>(1) If not taken as part of the statewide pattern, complete <u>all</u> of the following:</b></p> <ul style="list-style-type: none"> <li>• <b>A course that articulates with [SDSU MATH 254], Introduction to Linear Algebra</b> - Matrix algebra, Gaussian elimination, determinants, vector spaces, linear transformations, orthogonality, eigenvalues, and eigenvectors. <u>And</u></li> <li>• <b>A course that articulates with [SDSU MATH 245], Discrete Mathematics</b> - Logic, methods of proof, set theory, number theory, equivalence and order relations, counting (combinations and permutations), solving recurrence relations. <u>And</u></li> <li>• <b>A course that articulates with [SDSU STAT 250], Statistical Principles and Practices</b> - Descriptive statistics, data displays, measures of central tendency and variability, random variables, sampling distribution. Estimation and hypothesis tests for means and proportions, linear regression and correlation. <u>And</u></li> <li>• <b>A course that articulates with [SDSU MATH 241], Mathematics Software Workshop</b> - Introduction to mathematical software environment such as MATLAB, MAPLE, MATHEMATICA or the Geometers Sketchpad.</li> </ul>	<p><b>0-3 units</b></p> <p><b>0-3 units</b></p> <p><b>0-3 units</b></p> <p><b>0-1 unit</b></p>
<p><b>(2) The Bachelor of Arts in Mathematics is a Liberal Arts and Sciences degree and requires students to meet the following language requirement:</b></p> <ul style="list-style-type: none"> <li>• <b>Competency (successfully completing the third college semester or fifth college quarter - or equivalent) is required in one foreign language.</b></li> </ul>	<b>0-12 units</b>
<p><b>(3) 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.</b></p>	

In addition to the statewide pattern, the following is the San Diego State University campus-specific pattern for the B.S. in Math-Emphasis in Applied Math and the Emphasis in Science:

<b>Campus-Specific Pattern</b>	<b>Semester Unit Requirement</b>
<p><b>(1) If not taken as part of the statewide pattern, complete <u>all</u> of the following:</b></p> <ul style="list-style-type: none"> <li>• <b>A course that articulates with [SDSU MATH 254], Introduction to Linear Algebra</b> - Matrix algebra, Gaussian elimination, determinants, vector spaces, linear transformations, orthogonality, eigenvalues, and eigenvectors. <u>And</u></li> <li>• <b>A course that articulates with [SDSU MATH 245], Discrete Mathematics</b> - Logic, methods of proof, set theory, number theory, equivalence and order relations, counting (combinations and permutations), solving recurrence relations. <u>And</u></li> <li>• <b>A course that articulates with [SDSU STAT 250], Statistical Principles and Practices</b> - Descriptive statistics, data displays, measures of central tendency and variability, random variables, sampling distribution. Estimation and hypothesis tests for means and proportions, linear regression and correlation. <u>And</u></li> <li>• <b>A course that articulates with [SDSU CS 107], Introduction to Computer Programming</b> - Programming methodology and problem solving. Basic concepts of computer systems, algorithm design and development, data types, program structures. Extensive programming in Java. <u>And</u></li> <li>• <b>A course that articulates with [SDSU MATH 241], Mathematics Software Workshop</b> - Introduction to mathematical software environment such as MATLAB, MAPLE, MATHEMATICA or the Geometers Sketchpad.</li> </ul>	<p><b>0-3 units</b></p> <p><b>0-3 units</b></p> <p><b>0-3 units</b></p> <p><b>0-3 units</b></p> <p><b>0-1 unit</b></p>

**(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.**

In addition to the statewide pattern, the following is the San Diego State University campus-specific pattern for the B.S. in Math-Emphasis in Computational Science:

Campus-Specific Pattern	Semester Unit Requirement
<p><b>(1) If not taken as part of the statewide pattern, complete <u>all</u> of the following:</b></p> <ul style="list-style-type: none"> <li>• <b>A course that articulates with [SDSU MATH 254], Introduction to Linear Algebra</b> - Matrix algebra, Gaussian elimination, determinants, vector spaces, linear transformations, orthogonality, eigenvalues, and eigenvectors. <b>And</b></li> <li>• <b>A course that articulates with [SDSU MATH 245], Discrete Mathematics</b> - Logic, methods of proof, set theory, number theory, equivalence and order relations, counting (combinations and permutations), solving recurrence relations. <b>And</b></li> <li>• <b>A course that articulates with [SDSU STAT 250], Statistical Principles and Practices</b> - Descriptive statistics, data displays, measures of central tendency and variability, random variables, sampling distribution. Estimation and hypothesis tests for means and proportions, linear regression and correlation. <b>And</b></li> <li>• <b>A course that articulates with [SDSU CS 107], Introduction to Computer Programming</b> - Programming methodology and problem solving. Basic concepts of computer systems, algorithm design and development, data types, program structures. Extensive programming in Java. <b>And</b></li> <li>• <b>A course that articulates with [SDSU CS 108], Intermediate Computer Programming</b> - Further training in program design and development. Introduction to data structures: stacks, queues, linear lists, trees, sets, and recursion. Extensive programming in Java. <b>And</b></li> <li>• <b>A course that articulates with [SDSU CS 205], Introduction to Computational Programming and Visualization</b> - Problem-solving skills for needs of science. Use of computing and software tools of computational science introduced to gain competence in computer communications, programming, and visualization. Supervised computer laboratory.</li> <li>• <b>A course that articulates with [SDSU MATH 241], Mathematics Software Workshop</b> - Introduction to mathematical software environment such as MATLAB, MAPLE, MATHEMATICA or the Geometers Sketchpad.</li> </ul>	<p><b>0-3 units</b></p> <p><b>0-3 units</b></p> <p><b>0-3 units</b></p> <p><b>0-3 units</b></p> <p><b>0-3 units</b></p> <p><b>0-3 units</b></p> <p><b>0-1 unit</b></p>
<p><b>(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.</b></p>	

In addition to the statewide pattern, the following is the San Diego State University campus-specific pattern for the B.S. in Math-Emphasis in Mathematical Finance:

Campus-Specific Pattern	Semester Unit Requirement
<p><b>(1) If not taken as part of the statewide pattern, complete <u>all</u> of the following:</b></p> <ul style="list-style-type: none"> <li>• <b>A course that articulates with [SDSU MATH 254], Introduction to Linear Algebra</b> - Matrix algebra, Gaussian elimination, determinants, vector spaces, linear transformations, orthogonality, eigenvalues, and eigenvectors. <b>And</b></li> <li>• <b>A course that articulates with [SDSU MATH 245], Discrete Mathematics</b> - Logic, methods of proof, set theory, number theory, equivalence and order relations, counting (combinations and permutations), solving recurrence relations. <b>And</b></li> <li>• <b>A course that articulates with [SDSU ACCTG 201], Financial Accounting Fundamentals</b> - Theory and practice of accounting applicable to recording, summarizing, and reporting of business transactions for external reporting and other external uses. Asset valuation; revenue and expense recognition; various asset, liability, and capital accounts. <b>And</b></li> <li>• <b>A course that articulates with [SDSU ECON 101], Principles of Economics (macro)</b> - Principles of economic analysis, economic institutions, and issues of public policy. Emphasis on macroanalysis including national income analysis, money and banking, business cycles, and economic stabilization. <b>And</b></li> <li>• <b>A course that articulates with [SDSU ECON 102], Principles of Economics</b></li> </ul>	<p><b>0-3 units</b></p> <p><b>0-3 units</b></p> <p><b>0-3 units</b></p> <p><b>0-3 units</b></p> <p><b>0-3 units</b></p>

<p><b>(micro)</b> - Principles of economic analysis, economic institutions, and issues of public policy. Emphasis on direction of production, allocation of resources, and distribution of income, through the price system (microanalysis); and international economics. <u>And</u></p> <ul style="list-style-type: none"> <li>• <b>A course that articulates with [SDSU CS 107], Introduction to Computer Programming</b> - Programming methodology and problem solving. Basic concepts of computer systems, algorithm design and development, data types, program structures. Extensive programming in Java. <u>And</u></li> <li>• <b>A course that articulates with [SDSU MATH 241], Mathematics Software Workshop</b> - Introduction to mathematical software environment such as MATLAB, MAPLE, MATHEMATICA or the Geometers Sketchpad.</li> </ul>	<p><b>0-3 units</b></p> <p><b>0-1 unit</b></p>
<p><b>(2) If not taken as part of the statewide pattern, complete <u>one</u> of the following:</b></p> <ul style="list-style-type: none"> <li>• <b>A course that articulates with [SDSU STAT 119], Elementary Statistics for Business</b> - Measures of central tendency and variability, frequency distributions; probability, Bayes theorem, probability distributions (including binomial, hypergeometric, and normal), sampling distributions, confidence intervals, significance testing, regression and correlation. <u>Or</u></li> <li>• <b>A course that articulates with [SDSU STAT 250], Statistical Principles and Practices</b> - Descriptive statistics, data displays, measures of central tendency and variability, random variables, sampling distribution. Estimation and hypothesis tests for means and proportions, linear regression and correlation.</li> </ul>	<p><b>0-3 units</b></p>
<p><b>(3) 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.</b></p>	

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

<b>Campus-Specific Pattern</b>	<b>Semester Unit Requirement</b>
<p><b>(1) If not taken as part of the statewide pattern, complete <u>all</u> of the following:</b></p> <ul style="list-style-type: none"> <li>• <b>A course that articulates with [SDSU MATH 254], Introduction to Linear Algebra</b> - Matrix algebra, Gaussian elimination, determinants, vector spaces, linear transformations, orthogonality, eigenvalues, and eigenvectors. <u>And</u></li> <li>• <b>A course that articulates with [SDSU MATH 245], Discrete Mathematics</b> - Logic, methods of proof, set theory, number theory, equivalence and order relations, counting (combinations and permutations), solving recurrence relations.</li> </ul>	<p><b>0-3 units</b></p> <p><b>0-3 units</b></p>
<p><b>(2) If not taken as part of the statewide pattern, complete <u>one</u> of the following:</b></p> <ul style="list-style-type: none"> <li>• <b>A course that articulates with [SDSU CS 106], Introduction to Computer Programming with FORTRAN</b> - Introduction to problem solving on a computer, design of algorithms, and use of FORTRAN language. Extensive programming. <u>Or</u></li> <li>• <b>A course that articulates with [SDSU CS 107], Introduction to Computer Programming</b> - Programming methodology and problem solving. Basic concepts of computer systems, algorithm design and development, data types, program structures. Extensive programming in Java.</li> </ul>	<p><b>0-3 units</b></p>
<p><b>(3) If not taken as part of the statewide pattern, complete <u>one</u> of the following:</b></p> <ul style="list-style-type: none"> <li>• <b>A course that articulates with [SDSU STAT 119], Elementary Statistics for Business</b> - Measures of central tendency and variability, frequency distributions; probability, Bayes theorem, probability distributions (including binomial, hypergeometric, and normal), sampling distributions, confidence intervals, significance testing, regression and correlation. <u>Or</u></li> <li>• <b>A course that articulates with [SDSU STAT 250], Statistical Principles and Practices</b> - Descriptive statistics, data displays, measures of central tendency and variability, random variables, sampling distribution. Estimation and hypothesis tests for means and proportions, linear regression and correlation.</li> </ul>	<p><b>0-3 units</b></p>
<p><b>(4) 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.</b></p>	

In addition to the statewide pattern, the following is the San Diego State University campus-specific pattern for the B.S. in Statistics-Emphasis in Actuarial Science.

Campus-Specific Pattern	Semester Unit Requirement
<p><b>(1) If not taken as part of the statewide pattern, complete <u>all</u> of the following:</b></p> <ul style="list-style-type: none"> <li>• <b>A course that articulates with [SDSU MATH 254], Introduction to Linear Algebra</b> - Matrix algebra, Gaussian elimination, determinants, vector spaces, linear transformations, orthogonality, eigenvalues, and eigenvectors. <u>And</u></li> <li>• <b>A course that articulates with [SDSU MATH 245], Discrete Mathematics</b> - Logic, methods of proof, set theory, number theory, equivalence and order relations, counting (combinations and permutations), solving recurrence relations. <u>And</u></li> <li>• <b>A course that articulates with [SDSU ACCTG 201], Financial Accounting Fundamentals</b> - Theory and practice of accounting applicable to recording, summarizing, and reporting of business transactions for external reporting and other external uses. Asset valuation; revenue and expense recognition; various asset, liability, and capital accounts. <u>And</u></li> <li>• <b>A course that articulates with [SDSU ECON 101], Principles of Economics (macro)</b> - Principles of economic analysis, economic institutions, and issues of public policy. Emphasis on macroanalysis including national income analysis, money and banking, business cycles, and economic stabilization. <u>And</u></li> <li>• <b>A course that articulates with [SDSU ECON 102], Principles of Economics (micro)</b> - Principles of economic analysis, economic institutions, and issues of public policy. Emphasis on direction of production, allocation of resources, and distribution of income, through the price system (microanalysis); and international economics.</li> </ul>	<p><b>0-3 units</b></p> <p><b>0-3 units</b></p> <p><b>0-3 units</b></p> <p><b>0-3 units</b></p> <p><b>0-3 units</b></p>
<p><b>(2) If not taken as part of the statewide pattern, complete <u>one</u> of the following:</b></p> <ul style="list-style-type: none"> <li>• <b>A course that articulates with [SDSU CS 106], Introduction to Computer Programming with FORTRAN</b> - Introduction to problem solving on a computer, design of algorithms, and use of FORTRAN language. Extensive programming. <u>Or</u></li> <li>• <b>A course that articulates with [SDSU CS 107], Introduction to Computer Programming</b> - Programming methodology and problem solving. Basic concepts of computer systems, algorithm design and development, data types, program structures. Extensive programming in Java</li> </ul>	<p><b>0-3 units</b></p>
<p><b>(3) If not taken as part of the statewide pattern, complete <u>one</u> of the following:</b></p> <ul style="list-style-type: none"> <li>• <b>A course that articulates with [SDSU STAT 119], Elementary Statistics for Business</b> - Measures of central tendency and variability, frequency distributions; probability, Bayes theorem, probability distributions (including binomial, hypergeometric, and normal), sampling distributions, confidence intervals, significance testing, regression and correlation. <u>Or</u></li> <li>• <b>A course that articulates with [SDSU STAT 250], Statistical Principles and Practices</b> - Descriptive statistics, data displays, measures of central tendency and variability, random variables, sampling distribution. Estimation and hypothesis tests for means and proportions, linear regression and correlation.</li> </ul>	<p><b>0-3 units</b></p>
<p><b>(4) 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.</b></p>	

In addition to the statewide pattern, the following is the San Diego State University campus-specific pattern for the B.S. in Statistics-Emphasis in Statistical Computing:

Campus-Specific Pattern	Semester Unit Requirement
<p><b>(1) If not taken as part of the statewide pattern, complete <u>all</u> of the following:</b></p> <ul style="list-style-type: none"> <li>• <b>A course that articulates with [SDSU MATH 254], Introduction to Linear Algebra</b> - Matrix algebra, Gaussian elimination, determinants, vector spaces, linear transformations, orthogonality, eigenvalues, and eigenvectors. <u>And</u></li> <li>• <b>A course that articulates with [SDSU MATH 245], Discrete Mathematics</b> - Logic, methods of proof, set theory, number theory, equivalence and order relations, counting (combinations and permutations), solving recurrence relations. <u>And</u></li> <li>• <b>A course that articulates with [SDSU STAT 250], Statistical Principles and Practices</b> - Descriptive statistics, data displays, measures of central tendency and</li> </ul>	<p><b>0-3 units</b></p> <p><b>0-3 units</b></p> <p><b>0-3 units</b></p>

variability, random variables, sampling distribution. Estimation and hypothesis tests for means and proportions, linear regression and correlation. <u>And</u> <ul style="list-style-type: none"> <li>• <b>A course that articulates with [SDSU CS 107], Introduction to Computer Programming</b> - Programming methodology and problem solving. Basic concepts of computer systems, algorithm design and development, data types, program structures. Extensive programming in Java. <u>And</u></li> <li>• <b>A course that articulates with [SDSU CS 108], Intermediate Computer Programming</b> - Further training in program design and development. Introduction to data structures: stacks, queues, linear lists, trees, sets, and recursion. Extensive programming in Java. <u>And</u></li> <li>• <b>A course that articulates with [SDSU CS 205], Introduction to Computational Programming and Visualization</b> - Problem solving skills for needs of science. Use of computing and software tools of computational science introduced to gain competence in computer communications, programming, and visualization. Supervised computer laboratory.</li> </ul>	<b>0-3 units</b>  <b>0-3 units</b>  <b>0-3 units</b>
<b>(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.</b>	

**Mathematics**  
**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:

Campus-Specific Pattern	Semester Unit Requirement
<b>(1) If not taken as part of the statewide pattern, complete <u>all</u> of the following:</b> <ul style="list-style-type: none"> <li>• <b>A course that articulates with [SFSU ENG 114], College Composition, 1st semester</b> – Training in expository- argumentative composition, emphasizing work on clear and effective sentences and the organization and development of paragraph and essay. <u>And</u></li> <li>• <b>A course that articulates with [SFSU ENG 214], College Composition and Literature, 2nd semester</b> – Expository- argumentative composition and critical reading skills through the study of literature; special attention to logic, style, and rhetoric. <i>A minimum grade of C is necessary in courses used to meet this requirement.</i> <u>And</u></li> <li>• <b>A course that articulates with CSU GE Breadth AREA B1, Physical Science or IGETC AREA 5A, Physical Science.</b> <u>And</u></li> <li>• <b>A course that articulates with [SFSU CSC 210], Introduction to Computer Programming (using C++).</b></li> </ul>	<b>0-3 units</b>  <b>0-3 units</b>  <b>0-3 units</b>  <b>0-3 units</b>
<b>(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.</b>	

**Mathematics**  
**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 BA Mathematics or the BA Mathematics, Preparation for Teaching:

Campus-Specific Pattern	Semester Unit Requirement
<b>(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:</b> <ul style="list-style-type: none"> <li>• <b>A course that articulates with [SJSU ENGL 001B], Composition 2, or an equivalent 2<sup>nd</sup> Semester English Composition course approved for IGETC Area 1B.</b> <i>A minimum grade of C or higher is required in courses used to meet this requirement.</i></li> </ul>	<b>0-3 units</b>

<ul style="list-style-type: none"> <li>• <u>And</u></li> <li>• <b>Physical Activity.</b> <i>Two units taken in at least two different activities.</i> <u>And</u></li> <li>• <b>A course that articulates with [SJSU MATH 042], Discrete Mathematics.</b> <u>And</u></li> <li>• <b>A course that articulates with [SJSU PHYS 050], General Physics/Mechanics (Calculus-based).</b></li> </ul>	<p><b>0-2 units</b> <b>0-3 units</b> <b>0-4 units</b></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"> <li>• <b>A course that articulates with [SJSU PHYS 051], General Physics/Electricity and Magnetism (Calculus-based).</b> <u>Or</u></li> <li>• <b>A course that articulates with [SJSU PHYS 052], General Physics/Heat and Light (Calculus Based).</b></li> </ul>	<b>0-4 units</b>
<p>(3) If not taken as part of the statewide pattern complete <u>one</u> of the following:</p> <ul style="list-style-type: none"> <li>• <b>A course that articulates with [SJSU CS 046A], Introduction to Programming.</b> <u>Or</u></li> <li>• <b>A course that articulates with [SJSU CS 050], Scientific Computing.</b> <u>Or</u></li> <li>• <b>A course that articulates with [SJSU CS 049C], Programming in C.</b> <u>Or</u></li> <li>• <b>A course that articulates with [SJSU CS 049J], Programming in Java.</b></li> </ul>	<b>0-4 units</b>
<b>(4) If necessary, complete additional coursework to bring total to 60 transferable semester units.</b>	

In addition to the statewide pattern, the following is the San José State University campus-specific pattern for the BS Applied and Computational Mathematics - Emphasis in Applied Mathematics:

<b>Campus-Specific Pattern</b>	<b>Semester Unit Requirement</b>
<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"> <li>• <b>A course that articulates with [SJSU ENGL 001B], Composition 2,</b> or an equivalent 2<sup>nd</sup> 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></li> <li>• <b>Physical Activity.</b> <i>Two units taken in at least two different activities.</i> <u>And</u></li> <li>• <b>A course that articulates with [SJSU MATH 042], Discrete Mathematics.</b> <u>And</u></li> <li>• <b>A course that articulates with [SJSU CS 046A], Introduction to Programming.</b> <u>And</u></li> <li>• <b>A course that articulates with [SJSU CS 046B], Introduction to Data Structures.</b></li> </ul>	<p><b>0-3 units</b></p> <p><b>0-2 units</b> <b>0-3 units</b> <b>0-4 units</b> <b>0-4 units</b></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"> <li>• <b>A course that articulates with [SJSU PHYS 050], General Physics/Mechanics.</b> <u>Or</u></li> <li>• <b>A course that articulates with [SJSU PHYS 070], Mechanics.</b></li> </ul>	<b>0-4 units</b>
<p>(3) If not taken as part of the statewide pattern complete <u>one</u> of the following:</p> <ul style="list-style-type: none"> <li>• <b>A course that articulates with [SJSU PHYS 051], General Physics/Electricity and Magnetism.</b> <u>Or</u></li> <li>• <b>A course that articulates with [SJSU PHYS 071], Electricity and Magnetism.</b></li> </ul>	<b>0-4 units</b>
<b>(4) If necessary, complete additional coursework to bring total to 60 transferable semester units.</b>	

In addition to the statewide pattern, the following is the San José State University campus-specific pattern for the BS Applied and Computational Mathematics - Emphasis in Statistics:

<b>Campus-Specific Pattern</b>	<b>Semester Unit Requirement</b>
<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"> <li>• <b>A course that articulates with [SJSU ENGL 001B], Composition 2,</b> or an equivalent 2<sup>nd</sup> 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></li> <li>• <b>Physical Activity.</b> <i>Two units taken in at least two different activities.</i> <u>And</u></li> <li>• <b>A course that articulates with [SJSU MATH 042], Discrete Mathematics.</b></li> </ul>	<p><b>0-3 units</b></p> <p><b>0-2 units</b> <b>0-3 units</b></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"> <li>• <b>A course that articulates with [SJSU CS 046A], Introduction to Programming.</b> <u>Or</u></li> <li>• <b>A course that articulates with [SJSU CS 050], Scientific Computing.</b> <u>Or</u></li> </ul>	<b>0-4 units</b>

<ul style="list-style-type: none"> <li>• A course that articulates with [SJSU CS 049C], <b>Programming in C.</b> <u>Or</u></li> <li>• A course that articulates with [SJSU CS 049J], <b>Programming in Java.</b></li> </ul>	
<b>(3) If necessary, complete additional coursework to bring total to 60 transferable semester units.</b>	

In addition to the statewide pattern, the following is the San José State University campus-specific pattern for the BS Applied and Computational Mathematics - Emphasis in Economics, Finance, and Actuarial Science:

<b>(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:</b> <ul style="list-style-type: none"> <li>• A course that articulates with [SJSU ENGL 001B], <b>Composition 2</b>, or an equivalent 2<sup>nd</sup> 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></li> <li>• <b>Physical Activity.</b> <i>Two units taken in at least two different activities.</i> <u>And</u></li> <li>• A course that articulates with [SJSU MATH 042], <b>Discrete Mathematics.</b> <u>And</u></li> <li>• A course that articulates with [SJSU ECON 001A], <b>Principles of Economics: Macroeconomics.</b> <u>And</u></li> <li>• A course that articulates with [SJSU ECON 001B], <b>Principles of Economics: Microeconomics.</b></li> </ul>	<b>0-3 units</b>  <b>0-2 units</b> <b>0-3 units</b> <b>0-4 units</b>  <b>0-4 units</b>
<b>(2) If not taken as part of the statewide pattern complete <u>one</u> of the following:</b> <ul style="list-style-type: none"> <li>• A course that articulates with [SJSU CS 046A], <b>Introduction to Programming.</b> <u>Or</u></li> <li>• A course that articulates with [SJSU CS 050], <b>Scientific Computing.</b> <u>Or</u></li> <li>• A course that articulates with [SJSU CS 049C], <b>Programming in C.</b> <u>Or</u></li> <li>• A course that articulates with [SJSU CS 049J], <b>Programming in Java.</b></li> </ul>	<b>0-4 units</b>
<b>(3) If necessary, complete additional coursework to bring total to 60 transferable semester units.</b>	

## Mathematics 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
<b>(1) If not taken as part of the statewide pattern complete <u>one</u> of the following sequences in Physics:</b> <ul style="list-style-type: none"> <li>• Complete <u>both</u> of the following: <ul style="list-style-type: none"> <li>○ A course that articulates with [SLO PHYS 141], <b>General Physics IA.</b> <u>And</u></li> <li>○ A course that articulates with [SLO PHYS 132], <b>General Physics II.</b> <u>Or</u></li> </ul> </li> <li>• Complete <u>both</u> of the following: <ul style="list-style-type: none"> <li>○ A course that articulates with [SLO PHYS 141], <b>General Physics IA.</b> <u>And</u></li> <li>○ A course that articulates with [SLO PHYS 133], <b>General Physics III.</b> <u>Or</u></li> </ul> </li> <li>• Complete <u>all</u> of the following: <ul style="list-style-type: none"> <li>○ A course that articulates with [SLO PHYS 141], <b>General Physics IA.</b> <u>And</u></li> <li>○ A course that articulates with [SLO PHYS 132], <b>General Physics II.</b> <u>And</u></li> <li>○ A course that articulates with [SLO PHYS 133], <b>General Physics III.</b></li> </ul> <i>This requirement will be met with one year (8 semester hours) of calculus-based physics.</i> </li> </ul>	<b>0-3 units</b> <b>0-3 units</b>  <b>0-3 units</b> <b>0-3 units</b>  <b>0-1 units</b> <b>0-3 units</b> <b>0-3 units</b>
<b>(2) If not taken as part of the statewide pattern complete <u>all</u> of the following:</b> <ul style="list-style-type: none"> <li>• A course that articulates with [SLO MATH 242], <b>Differential Equations I.</b> <u>And</u></li> <li>• A course that articulates with [SLO MATH 206], <b>Linear Algebra I.</b></li> </ul>	<b>0-3 units</b> <b>0-3 units</b>
<b>(3) If necessary, complete additional coursework to bring total to 60 transferable semester units.</b>	

**Mathematics**  
**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	Semester Unit Requirement
<b>(1) If not taken as part of the statewide pattern complete <u>all</u> of the following:</b> <ul style="list-style-type: none"> <li>• A course that articulates with Physics [CSUSM PHYS 201], Calculus based. <u>And</u></li> <li>• A course that articulates with [CSUSM CS 111], Programming Concepts and Methodology.</li> </ul>	<b>0-4 units</b> <b>0-3 units</b>
<b>(2) If not taken as part of the statewide pattern complete at least <u>two</u> of the following:</b> <ul style="list-style-type: none"> <li>• A course that articulates with [CAN BIOL 2], Principles of Biology: Cell/Molecular Biology. <u>Or</u></li> <li>• A course that articulates with [CSUSM BIOL 210], Principles of Animal Diversity. <u>Or</u></li> <li>• A course that articulates with [CSUSM BIOL 211], Principles of Plant Diversity. <u>Or</u></li> <li>• A course that articulates with [CSUM CHEM 150], 1st Semester of General Chemistry for Science Majors with Laboratory. <u>Or</u></li> <li>• A course that articulates with [CSUM PHYS 202], Calculus based Physics. <u>Or</u></li> <li>• A course that articulates with [CSUM CS 211], Programming Concepts and Methodology II.</li> </ul>	<b>0-8 units</b>
<b>(3) If necessary, complete additional coursework to bring total to 60 transferable semester units.</b>	

**Mathematics**  
**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
<b>(1) If not taken as part of the statewide pattern complete <u>all</u> of the following:</b> <ul style="list-style-type: none"> <li>• A course that articulates with [CAN MATH 24], Differential Equations. <u>And</u></li> <li>• A course that articulates with [CAN MATH 26], Linear Algebra. <u>And</u></li> <li>• A course that articulates with, A Calculus-based Physics course.</li> </ul>	<b>0-3 units</b> <b>0-3 units</b> <b>0-4 units</b>
<b>(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.</b>	

**Mathematics**  
**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
<b>(1) If not taken as part of the statewide pattern complete <u>all</u> of the following:</b> <ul style="list-style-type: none"> <li>• A course that articulates with [CAN MATH 26], Linear Algebra. <u>And</u></li> <li>• A course that articulates with [CAN STAT 2], Probability and Statistics. <u>And</u></li> <li>• A course that articulates with CSU GE Breadth Area B1, Physical Science.</li> </ul>	<b>0-3 units</b> <b>0-3 units</b> <b>0-3 units</b>
<b>(2) If necessary, complete additional coursework to bring total to 60 transferable semester units.</b>	

