

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 (GE-Breadth) or the Intersegmental General Education Transfer Curriculum (IGETC) pattern;
- Completion of the CSU graduation requirements in United States History, Constitution and American Ideals; and
- Completion of additional semester units as specified in (3) 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 impact 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 <i>certification of completion</i> of GE-Breadth or IGETC by the California Community College before transferring to a CSU campus. <i>The course to be used to satisfy GE-Breadth Area B1 or IGETC Area 5A will be identified with the campus-specific requirements.</i></p> <p>While completing general education, follow the course pattern stated below.</p>	<p>36 units for GE-Breadth Minimum grades of C are required in courses used to meet GE-Breadth Areas A and B4.</p> <p>or</p> <p>34 units for IGETC Minimum grade of C is required in each course used for IGETC.</p>
<p>(2) Complete the graduation requirements in United States History, Constitution and American Ideals.¹</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>Students completing GE-Breadth should ordinarily use these courses to satisfy 6 units of Area D.</p>	<p>0 units required for GE-Breadth</p> <p>6 units for IGETC IGETC does <u>not</u> permit double counting of courses to meet IGETC and U.S. History, Constitution and American Ideals requirements.</p>
<p>(3) Complete three semesters of Calculus [CAN MATH SEQ C].</p> <p>Where possible, the first semester course should be used to satisfy GE-Breadth Area B4 or IGETC Area 2.</p>	<p>9 units</p>
Total Semester Units Required for Statewide LDTP Pattern	45 Units (GE-Breadth)

¹ CCC courses that fulfill general education and graduation requirements in United States History, Constitution and American Ideals are listed at www.assist.org.

	49 Units (IGETC)
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CSU Bakersfield Campus-Specific Pattern

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

Campus-Specific Pattern	Semester Unit Requirement
(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with [CAN CSCI 18], Programming in the C++ Language and • A course that articulates with [CAN CSCI 12], Programming in the PASCAL Language and • A course that articulates with [CAN CSCI 20], Programming in the FORTRAN Language for Science and Engineering and • A course that articulates with GE-Breadth Area B1 	<p style="text-align: center;">0-3 units</p> <p style="text-align: center;">0-3 units</p> <p style="text-align: center;">0-3 units</p> <p style="text-align: center;">0-3 units</p>
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-3 units
Total Semester Units Required for CSU Bakersfield	15 units

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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
(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with [CAN CSCI 16], Programming in the C Language or A course that articulates with [CAN CSCI 18], Programming in the C++ Language or A course that articulates with [CAN CSCI 24], Programming Concepts and Methodology II and • A course that articulates with [CAN PHYS 8], Physics (Calculus-based) 	<p style="text-align: center;">0-3 units</p> <p style="text-align: center;">0-4 units</p>
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-8 units
Total Semester Units Required for CSU Channel Islands	15 units

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CSU Chico Campus-Specific Pattern

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

Campus-Specific Pattern	Semester Unit Requirement
(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> A course that articulates with [CAN CSCI 18], Programming in the C++ Language or A course that articulates with [CAN CSCI 22], Programming Concepts and Methodology I and A course that articulates with GE-Breadth Area B1 	0-3 units 0-3 units
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-9 units
Total Semester Units Required for CSU Chico	15 units

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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 of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> A course that articulates with [CAN PHYS 8], Physics (Calculus-based and A course that articulates with [CAN PHYS 12], Physics (Calculus-based) and A course that articulates with [CAN CSCI 4, 12, 16, 18 or 20], A Computer Programming course and A course that articulates with [CAN MATH 26], Linear Algebra 	0-4 units 0-4 units 0-4 units 0-3 units
Total Semester Units Required for the Mathematics Option at CSU Dominguez Hills	15 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 (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> A course that articulates with [CAN PHYS 8], Calculus based Physics I] and A course that articulates with [CAN PHYS 12], Calculus based Physics II and 	0-4 units 0-4 units 0-3 units 0-3 units

<ul style="list-style-type: none"> • A course that articulates with [CAN STAT 2], Introduction to Statistics and • A course that articulates with [CAN MATH 26], Linear Algebra 	
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-1 unit
Total Semester Units Required for the Mathematics Education Option at CSU Dominguez Hills	15 units

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CSU East Bay Campus-Specific Pattern

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

Campus-Specific Pattern	Semester Unit Requirement
(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with [CAN MATH 26], Linear Algebra and • A course that articulates with [CAN CSCI 18], Programming in the C++ Language or A course that articulates with [CAN CSCI 22], Programming Concepts and Methodology I and • A course that articulates with Any course to satisfy GE-Breadth Area B1 	0-3 units 0-3 units 0-3 units
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-6 units
Total Semester Units Required for CSU East Bay	15 units

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CSU Fresno Campus-Specific Pattern

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

Campus-Specific Pattern	Semester Unit Requirement
(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with [CAN MATH 24], Differential Equations and • A course that articulates with [CAN MATH 26], Linear Algebra and • A course that articulates with [CAN PHYS 8], Physics 	0-3 units 0-3 units 0-4 units
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-5 units
Total Semester Units Required for CSU Fresno	15 units

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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 (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> A course that articulates with [CSUF MATH 250B], Introduction to Linear Algebra and Differential Equations - A course that introduces the solutions of ordinary differential equations and their relationship to linear algebra and A course that articulates with GE-Breadth Area B1 	0-4 units 0-3 units
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-8 units
Total Semester Units Required for CSU Fullerton	15 units

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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 (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> A course that articulates with [CAN MATH 26], Linear Algebra and A course that articulates with [CAN CSCI 4, 6, 12, 16, 18, or 20], A Computer Programming course and A course that articulates with a course that satisfies the IGETC or GE requirement in the Physical Sciences 	0-3 units 0-4 units 0-3 units
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-5 units
Total Semester Units Required for Humboldt State University	15 units

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CSU Long Beach Campus-Specific Pattern

In addition to the statewide pattern, the following is the CSU Long Beach campus-specific pattern for the **Pure Mathematics Option**:

Campus-Specific Pattern	Semester Unit Requirement
(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with [CAN MATH 26], Linear Algebra and • A course that articulates with [CAN CSCI 18], Computer Programming and • A course that articulates with [CAN PHYS 8], Calculus based Physics I 	<p style="text-align: center;">3 units</p> <p style="text-align: center;">3 units</p> <p style="text-align: center;">4 units</p>
(2) Complete additional coursework to bring total to 60 transferable semester units.	5 units
Total Semester Units Required for the Pure Mathematics Option at CSU Long Beach	15 units

In addition to the statewide pattern, the following is the CSU Long Beach campus-specific pattern for the **Applied Mathematics Option: Sub-option 1. Area of application in science and engineering**:

Campus-Specific Pattern	Semester Unit Requirement
(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with [CAN MATH 26], Linear Algebra and • A course that articulates with [CAN CSCI 18], Computer Programming] and • A course that articulates with [CAN PHYS 8], Calculus based Physics I and • A course that articulates with [CAN PHYS 12], Calculus based Physics II 	<p style="text-align: center;">0-3 units</p> <p style="text-align: center;">0-3 units</p> <p style="text-align: center;">0-4 units</p> <p style="text-align: center;">0-4 units</p>
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-1 unit
Total Semester Units Required for Applied Mathematics (Option 1) at CSU Long Beach	15 units

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

Campus-Specific Pattern	Semester Unit Requirement
(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with [CAN MATH 26], Linear Algebra and • A course that articulates with [CAN CSCI 18], Computer Programming and • A course that articulates with [CAN ECON 2], Principles of Macroeconomics and • A course that articulates with [CAN ECON 4], Principles of 	<p style="text-align: center;">0-3 units</p> <p style="text-align: center;">0-3 units</p> <p style="text-align: center;">0-3 units</p> <p style="text-align: center;">0-3 units</p>

Microeconomics	
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-3 units
Total Semester Units Required for Applied Mathematics (Option 2) at CSU Long Beach	15 units

In addition to the statewide pattern, the following is the CSU Long Beach campus-specific pattern for the **Statistics Option**:

Campus-Specific Pattern	Semester Unit Requirement
(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with [CAN MATH 26], Linear Algebra and • A course that articulates with [CAN CSCI 18] Computer Programming And <u>one</u> of the following sequences: <ul style="list-style-type: none"> • A course that articulates with [CAN ECON 2], Principles of Macroeconomics and • A course that articulates with [CAN ECON 4], Principles of Microeconomics or • A course that articulates with [CAN BIOL 2], General Biology and • A course that articulates with [CAN BIOL 10 or CAN BIOL 12], Human Biology 	<p>0-3 units</p> <p>0-3 units</p> <p>0-6 units</p>
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-3 units
Total Semester Units Required for the Statistics Option at CSU Long Beach	15 units

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

Campus-Specific Pattern	Semester Unit Requirement
(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with [CAN MATH 26], Linear Algebra and And <u>one</u> of the following sequences: <ul style="list-style-type: none"> • A course that articulates with [CAN PHYS 8], Calculus based Physics I and • A course that articulates with [CAN PHYS 12], Calculus based Physics II or • A course that articulates with [CAN PHIL 6], Introduction to Symbolic Logic or • A course that articulates with a one year course in any Foreign Language 	<p>0-3 units</p> <p>0-8 units</p>
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-6 units
Total Semester Units Required for the Mathematics Education Option at	15 units

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CSU Los Angeles Campus-Specific Pattern

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

Campus-Specific Pattern	Semester Unit Requirement
(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • Courses that articulate with Physics [CAN PHYS 8 and CAN PHYS 12] and • A course that articulates with [CAN MATH 26], Linear Algebra and • A course that articulates with [CAN STAT 2], Statistics and • A course that articulates with [CAN CSCI 18], A course in object oriented programming <p>And <u>one</u> of the following:</p> <ul style="list-style-type: none"> • A course that articulates with [CAN CSCI 26], Discrete Mathematics or • A course that articulates with [CAN MATH 24], Differential Equations (Note: <i>This course counts as an elective for the BA and as a requirement for the BS degree</i>), or • 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”) 	0-6 units 0-3 units 0-3 units 0-3 units 0-3 units
(2) Complete additional coursework, if necessary, to bring total to 60 transferable semester units.	
Total Semester Units Required for CSU Los Angeles	18 units

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California Maritime Academy Campus-Specific Pattern

In addition to the statewide pattern, the following is the California Maritime Academy campus-specific pattern:

Campus-Specific Pattern	Semester Unit Requirement
(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with a course that satisfies the IGETC or GE requirement in the Physical Sciences and • A course that articulates with [CAN MATH 26], Linear Algebra and • A course that articulates with [CAN CSCI 26, CMA MATH 170], Discrete Mathematics - A course that covers sets and sequences, elementary logic, relations, induction, counting principles, discrete probability, Boolean algebra, logic networks, matrices, graph theory, and trees. 	<p style="text-align: center;">0-3 units</p> <p style="text-align: center;">0-3 units</p> <p style="text-align: center;">0-3 units</p>
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-6 units
Total Semester Units Required for California Maritime Academy	15 units

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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 (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with a course that satisfies the IGETC or the CSU Lower Division GE requirement in the Physical Sciences and • A course that articulates with [CAN MATH 26], Linear Algebra and • A course that articulates with [CSUMB MATH 170], Discrete Mathematics - A course that covers sets and sequences, elementary logic, relations, induction, counting principles, discrete probability, Boolean algebra, logic networks, matrices, graph theory, and trees. 	<p style="text-align: center;">0-3 units</p> <p style="text-align: center;">0-3 units</p> <p style="text-align: center;">0-3 units</p>
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-6 units
Total Semester Units Required for CSU Monterey Bay	15 units

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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
(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with [CAN MATH 26], Linear Algebra and • A course that articulates with [CAN CSCI 4, 6, 10, 12, 14, 16, 18, or 20], A Computer Programming course and • A course that articulates with [CAN PHIL 6], Logic and • A course that articulates with [CAN PHYS 8], Calculus based Physics I and • A course that articulates with [CAN PHYS 12], Calculus based Physics II 	0-3 units 0-4 units 0-3 units
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-6 units
Total Semester Units Required for CSU Northridge	15 units

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
(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with any course to satisfy GE-Breadth Area B1 	0-3 units
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-12 units
Total Semester Units Required for Cal Poly Pomona	15 units

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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 (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with [CAN MATH 26], Linear Algebra and • A course that articulates with [CAN MATH 24], Differential Equations and • A course that articulates with an IGETC or GE requirement in the Physical Sciences <p>And a Computer Science course chosen from:</p> <ul style="list-style-type: none"> • A course that articulates with [CAN CSCI 20], Programming in the Fortran Language for Science and Engineering or • A course that articulates with [CAN CSCI 22], Programming Concepts and Methodology I or • A course that articulates with [CAN CSCI 16], Introduction to C Programming 	0-3 units 0-3 units 0-3 units 0-3 units
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-3 units
Total Semester Units Required for CSU Sacramento	15 units

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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 (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with [CAN MATH 26], Linear Algebra and • A course that articulates with [CAN MATH 24], Differential Equations and • A course that articulates with [CAN CSCI 22], Programming Concepts and Methodology I or A course that articulates with [CAN CSCI 24], Programming Concepts and Methodology II or A course that articulates with [CAN CSCI 4], Programming in the FORTRAN Language (in that order of preference) and • A course that articulates with [CAN PHYS 8], Physics (Calculus-based) (required in the B.S. but not the B.A.) or A course that articulates with the IGETC or GE requirement in the Physical Sciences 	<p style="text-align: center;">0-3 units</p> <p style="text-align: center;">0-3 units</p> <p style="text-align: center;">0-3 units</p> <p style="text-align: center;">0-4 units</p>
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-3 units
Total Semester Units Required for CSU San Bernardino	15 units

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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 (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with [CAN MATH 26, SDSU MATH 254] Linear Algebra - Matrix algebra, Gaussian elimination, determinants, vector spaces, linear transformations, orthogonality, eigenvalues, and eigenvectors. and • A course that articulates with [CAN CSCI 26, SDSU MATH 245], Discrete Mathematics - Logic, methods of proof, set theory, number theory, equivalence and order relations, counting (combinations and permutations), solving recurrence relations. and • A course that articulates with [CAN CSCI 22, SDSU CS 107], 	<p style="text-align: center;">0-3 units</p> <p style="text-align: center;">0-3 units</p> <p style="text-align: center;">0-3 units</p>

Computer Programming - Programming methodology and problem solving. Basic concepts of computer systems, algorithm design and development, data types, program structures. Extensive programming in Java. The Mathematics major is a Liberal Arts and Sciences degree and requires students to meet the following language requirement: Competency (successfully completing the third college semester or fifth college quarter – or equivalent) is required in one foreign language. If not already complete, students should meet some of this requirement in satisfaction of area C – Humanities in GE.	0-12 units
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-6 units
Total Semester Units Required for the B.A. in Math-No Emphasis at San Diego State University	15 units

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**.

Campus-Specific Pattern	Semester Unit Requirement
(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with [CAN MATH 26, SDSU MATH 254], Linear Algebra - Matrix algebra, Gaussian elimination, determinants, vector spaces, linear transformations, orthogonality, eigenvalues, and eigenvectors. and • A course that articulates with [CAN CSCI 26, SDSU MATH 245], Discrete Mathematics - Logic, methods of proof, set theory, number theory, equivalence and order relations, counting (combinations and permutations), solving recurrence relations. and • A course that articulates with [CAN STAT 2, SDSU STAT 250], Statistics - 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. The Mathematics major is a Liberal Arts and Sciences degree and requires students to meet the following language requirement: Competency (successfully completing the third college semester or fifth college quarter – or equivalent) is required in one foreign language. If not already complete, students should meet some of this requirement in satisfaction of area C – Humanities in GE.	0-3 units 0-3 units 0-3 units 0-12 units
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-6 units
Total Semester Units Required for the B.A. in Math-Emphasis in Single Subject at San Diego State University	15 units

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**:

Campus-Specific Pattern	Semester Unit Requirement
(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with [CAN MATH 26, SDSU MATH 254], Linear Algebra - Matrix algebra, Gaussian elimination, determinants, vector spaces, linear transformations, orthogonality, eigenvalues, and eigenvectors. and • A course that articulates with [CAN CSCI 26, SDSU MATH 245], Discrete Mathematics - Logic, methods of proof, set theory, number theory, equivalence and order relations, counting (combinations and permutations), solving recurrence relations. and • A course that articulates with [CAN STAT 2, SDSU STAT 250], Statistics - 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. and • A course that articulates with [CAN CSCI 22, SDSU CS 107], Programming Concepts and Methodology I - Programming methodology and problem solving. Basic concepts of computer systems, algorithm design and development, data types, program structures. Extensive programming in Java. 	<p>0-3 units</p> <p>0-3 units</p> <p>0-3 units</p> <p>0-3 units</p>
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-3 units
Total Semester Units Required for the B.S. in Math-Emphasis in Applied Math at San Diego State University	15 units

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
If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with [CAN MATH 26, SDSU MATH 254], Linear Algebra - Matrix algebra, Gaussian elimination, determinants, vector spaces, linear transformations, orthogonality, eigenvalues, and eigenvectors. and • A course that articulates with [CAN CSCI 26, SDSU MATH 245], Discrete Mathematics - Logic, methods of proof, set theory, number theory, equivalence and order relations, counting (combinations and permutations), solving recurrence relations. and • A course that articulates with [CAN STAT 2, SDSU STAT 250], Statistics - 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. and • A course that articulates with [CAN CSCI 22, SDSU CS 107], Computer Programming - Programming methodology and problem solving. Basic concepts of computer systems, algorithm design and development, data types, program structures. 	<p>0-3 units</p> <p>0-3 units</p> <p>0-3 units</p> <p>0-3 units</p>

<p>Extensive programming in Java. and</p> <ul style="list-style-type: none"> • A course that articulates with [CAN CSCI 24, SDSU CS 108], Computer Programming - Further training in program design and development. Introduction to data structures: stacks, queues, linear lists, trees, sets, and recursion. Extensive programming in Java. • A course that articulates with [SDSU CS 205], Introduction to Computational Programming and Visualization - 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. 	<p>0-3 units</p> <p>0-3 units</p>
Total Semester Units Required for the B.S. in Math-Emphasis in Computational Science at San Diego State University	18 units

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 Math Finance**.

Campus-Specific Pattern	Semester Unit Requirement
<p>(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete:</p> <ul style="list-style-type: none"> • A course that articulates with [CAN MATH 26, SDSU MATH 254], Linear Algebra - Matrix algebra, Gaussian elimination, determinants, vector spaces, linear transformations, orthogonality, eigenvalues, and eigenvectors. and • A course that articulates with [CAN CSCI 26, SDSU MATH 245], Discrete Mathematics - Logic, methods of proof, set theory, number theory, equivalence and order relations, counting (combinations and permutations), solving recurrence relations. and • A course that articulates with A course that articulates with [CAN STAT 2, SDSU STAT 250], Statistics - 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. and • A course that articulates with [CAN BUS 2, SDSU ACCTG 201], Accounting - 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. and • A course that articulates with [CAN ECON 2, SDSU ECON 101], Economics - 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. 	<p>0-3 units</p> <p>0-3 units</p> <p>0-3 units</p> <p>0-3 units</p> <p>0-3 units</p>
<p>(2) If students take more units beyond 60 (but not more than 70), they should complete the following courses at their community college to satisfy SDSU's lower division major preparation requirements:</p> <ul style="list-style-type: none"> • A course that articulates with [CAN CSCI 22, SDSU CS 107], Programming Concepts and Methodology I - Programming methodology and problem solving. Basic concepts of computer systems, algorithm design and development, data types, program 	<p>0-3 units</p>

<ul style="list-style-type: none"> • A course that articulates with [CAN STAT 2, SDSU STAT 250], Statistics - 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. and • A course that articulates with [CAN BUS 2, SDSU ACCTG 201], Accounting - 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. and • A course that articulates with [CAN ECON 2, SDSU ECON 101], Economics - 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. 	<p>0-3 units</p> <p>0-3 units</p> <p>0-3 units</p>
<p>(2) If students take more units beyond 60 (but not more than 70), they should complete the following courses at their community college to satisfy SDSU's lower division major preparation requirements:</p> <ul style="list-style-type: none"> • A course that articulates with [CAN CSCI 22, SDSU CS 107], Programming Concepts and Methodology I - Programming methodology and problem solving. Basic concepts of computer systems, algorithm design and development, data types, program structures. and • A course that articulates with [CAN ECON 4, SDSU ECON 102], Introduction to Microeconomics - 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. 	<p>0-3 units</p> <p>0-3 units</p>
Total Semester Units Required for the B.S. in Statistics-Emphasis in Actuarial Science at San Diego State University	18 units

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>(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete:</p> <ul style="list-style-type: none"> • A course that articulates with [CAN MATH 26, SDSU MATH 254], Linear Algebra - Matrix algebra, Gaussian elimination, determinants, vector spaces, linear transformations, orthogonality, eigenvalues, and eigenvectors. and • A course that articulates with [CAN CSCI 26, SDSU MATH 245], Discrete Mathematics - Logic, methods of proof, set theory, number theory, equivalence and order relations, counting (combinations and permutations), solving recurrence relations. and • A course that articulates with [CAN STAT 2, SDSU STAT 250], Statistics - a 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. and 	<p>0-3 units</p> <p>0-3 units</p> <p>0-3 units</p>

<ul style="list-style-type: none"> • A course that articulates with [CAN CSCI 22, SDSU CS 107], Computer Programming - Programming methodology and problem solving. Basic concepts of computer systems, algorithm design and development, data types, program structures. and • A course that articulates with [CAN CSCI 24, SDSU CS 108], Computer Programming - Further training in program design and development. Introduction to data structures: stacks, queues, linear lists, trees, sets, and recursion. Extensive programming in Java. 	<p>0-3 units</p> <p>0-3 units</p>
<p>(2) If students take more units beyond 60 (but not more than 70), they should complete the following courses at their community college to satisfy SDSU's lower division major preparation requirements:</p> <ul style="list-style-type: none"> • A course that articulates with [SDSU CS 205], Introduction to Computational Programming and Visualization - 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. 	<p>0-3 units</p>
<p>Total Semester Units Required for the B.S. in Statistics-Emphasis in Statistical Computing at San Diego State University</p>	<p>18 units</p>

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
<p>(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete:</p> <ul style="list-style-type: none"> • A course that articulates with [CAN ENGL 2, 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. and • A course that articulates with [CAN ENGL 4, 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. and • A course that articulates with an IGETC or GE requirement in the Physical Sciences and • A course that articulates with [CAN CSCI 24], Programming in the C++ Language or A course that articulates with [CAN CSCI 18], Programming Concepts and Methodology II 	<p>0-3 units</p> <p>0-3 units</p> <p>0-3 units</p> <p>0-3 units</p>
<p>(2) Complete additional coursework to bring total to 60 transferable semester units.</p>	<p>0-9 units</p>
<p>Total Semester Units Required for San Francisco State University</p>	<p>15 units</p>

Mathematics

LOWER-DIVISION TRANSFER PATTERN

San Jose State University Campus-Specific Pattern

In addition to the statewide pattern, the following is the San Jose State University campus-specific pattern:

Campus-Specific Pattern	Semester Unit Requirement
<p>(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete:</p> <ul style="list-style-type: none"> • A course that articulates with [CAN CSCI 26, SJSU MATH 42], Boolean algebras - A course that covers sets, logic, methods of proof including mathematical induction, functions, relations, elementary combinatorics, probability and • A course that articulates with [CAN PHYS SEQ B], Physics (Calculus-based) <p>And a Computer Programming course from one of the following:</p> <ul style="list-style-type: none"> • A course that articulates with [SJSU CS 046A], Introduction to Programming - A course that covers classes, methods and argument passing, control structures, iteration and recursion; basic graphical user interface programming; problem solving, class discovery and step-wise refinement; programming and documentation style. or • A course that articulates with [SJSU CS 050], Scientific Computing - A course that covers computer systems and programming, emphasizing solution of problems in atmospheric sciences and including computer systems, flow diagrams, UNIX and C FORTRAN programming, mass data handling and formatting. or • A course that articulates with [SJSU CS 049], Programming in C - A beginning course in the C language. 	<p style="text-align: center;">0-3 units</p> <p style="text-align: center;">0-4 units</p> <p style="text-align: center;">0-2 units</p> <p style="text-align: center;">0-3 units</p>
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-3 units
Total Semester Units Required for San Jose State University	15 units

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
(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> A course that articulates with [CAN MATH 24], Differential Equations and A course that articulates with [CAN MATH 26], Linear Algebra and A course that articulates with [CAN PHYS 8 or CAN PHYS 12 or CAN PHYS 14], Calculus based Physics 	0-3 units 0-3 units 0-4 units
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-5 units
Total Semester Units Required for Cal Poly San Luis Obispo	15 units

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
(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> A course that articulates with Physics [CAN PHYS 8], Calculus based and A course that articulates with [CAN CSCI 22], Programming Concepts and Methodology And <u>two</u> of the following courses: <ul style="list-style-type: none"> A course that articulates with [CAN BIOL 2], Principles of Biology: Cell/Molecular Biology A course that articulates with [CAN BIOL 4], Principles of Animal Diversity or A course that articulates with [CAN BIOL 6] Principles of Plant Diversity A course that articulates with [CAN CHEM 2], 1st Semester of General Chemistry for Science Majors with Laboratory A course that articulates with [CAN PHYS 12], Calculus based Physics A course that articulates with [CAN CSCI 24], Programming Concepts and Methodology II 	0-4 units 0-3 units 0-8 units
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-1 units
Total Semester Units Required for CSU San Marcos	15 units

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
(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with [CAN MATH 24], Differential Equations and • A course that articulates with [CAN MATH 26], Linear Algebra and • A course that articulates with, A Calculus-based Physics course 	0-3 units 0-3 units 0-4 units
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-5 units
Total Semester Units Required for Sonoma State University	15 units

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
(1) If not taken as part of the statewide pattern (including general education and/or major preparation requirements), complete: <ul style="list-style-type: none"> • A course that articulates with [CAN MATH 26], Linear Algebra and • A course that articulates with [CAN STAT 2], Probability and Statistics and • A course that articulates with an IGETC or GE requirement in the Physical Sciences 	0-3 units 0-3 units 0-3 units
(2) Complete additional coursework to bring total to 60 transferable semester units.	0-6 units
Total Semester Units Required for CSU Stanislaus	15 units