STEM

The Associate in Science in General Studies with an Emphasis in Science and Mathematics will be awarded to students upon completion of general education degree requirements and 18 units in this area. These courses emphasize the study of mathematical and quantitative reasoning skills and apply the facts and principles that form the foundations of living and non-living systems. Students will recognize and utilize the methodologies of science as investigative tools, as well as the limitations of science. Students will use mathematical skills to solve numerical problems encountered in daily life, and more advanced skills for applications in the physical and life sciences. Students must complete a minimum of six units in Science and six units in Mathematics (limitation of one statistics course). The remaining six units may be taken from any category.

Program Learning Outcomes

Upon successful completion of this program, students will be able to:
• Use algebraic methods to solve problems.
• Interpret basic mathematical models and draw inferences from them.
• Represent mathematical information symbolically, visually, numerically and verbally.
• Use the scientific method of inquiry and techniques to answer questions about physical and biological processes.
• Analyze basic concepts of physical and biological science to evaluate scientific information and solve scientific problems.

Science
ANTH 130
ASTR 110, 112
BIO 112, 115, 122, 130, 131, 133, 134, 135, 140, 141, 141L, 152, 230, 240, 251
CHEM 102, 115, 116, 120, 141, 142, 231, 232
ET 110
GEOG 120, 121
GEOL 104, 110, 111
OCEA 112, 113
PHYC 110, 130, 131, 190, 200, 210

Mathematics
BIO 215
MATH 160, 170, 175, 176, 178, 180, 245, 280, 281, 284, 285
PSY 215

CADD and Engineering
CADD 115, 120, 125, 129, 131
ENGR 100, 119, 120, 125, 129, 175, 176, 218, 270

Computer Science
CS 119, 119L, 181, 182, 281, 282

MATHEMATICS

Associate Degree for Transfer℠

I.   MATHEMATICS FOR TRANSFER (AS-T)
This program is designed to prepare students for transfer to a California State University (CSU) with the intent of earning a B.S. degree in Mathematics. Since jobs requiring mathematical skills such as data analysis, problem solving, pattern recognition, statistics, and probability are in high demand, the mathematics major may benefit both educationally and economically from developing and pursuing an interest in mathematics. Mathematical skills and statistical methods are employed regularly by researchers

testing hypotheses, by workers applying quality control in manufacturing, and by informed citizens who must evaluate information from the media in tabular, graphical, and report form in order to reach solutions. This major offers a foundation in these necessary skills. The emphasis is to prepare students for transfer to a four-year institution and/or for career preparation in a vocational or professional field.

The following is required for the AS-T in Mathematics for Transfer degree:

1. Minimum of 60 semester or 90 quarter CSU-transferable units.
2. Minimum grade point average (GPA) of at least 2.0 in all CSU-transferable coursework.
3. Minimum of 18 semester or 27 quarter units in the major.
4. A grade of "C" or better in all courses required for the major.
5. Certified completion of the California State University General Education (CSU GE) Breadth pattern OR the Intersegmental General Education Transfer Curriculum (IGETC) pattern; see Degree Requirements and Transfer Information section for more information. Note: If following IGETC, IGETC-CSU must be followed for admission to a CSU.

Program Learning Outcomes

Upon successful completion of this program, students will be able to:
• Apply mathematical reasoning and problem solving strategies to analyze, interpret, and model applications from degree and transfer-level courses and programs in math, science, engineering, business, and technology.
• Select and apply appropriate definitions, postulates, and theorems to prove mathematical statements.

Associate in Science Degree Requirements:

Core Curriculum:

Course	Title	Units
MATH 180	Analytic Geometry and Calculus I	5
MATH 280	Analytic Geometry and Calculus II	4
MATH 281	Multivariable Calculus	4
		13

List A: Select one of the following:

MATH 284	Linear Algebra	3
MATH 285	Differential Equations	3
		3

List B: Select one of the following:

CS 181	Intro to C++ Programing	4
MATH 160	Elementary Statistics	4
MATH 245	Discrete Mathematics	3
PHYC 190	Mechanics and Heat	5
Any course from List A not selected above		3
		3-5

Total Units for Major (3-6 units may be double-counted with GE)   19-21
Total Units for CSU GE Breadth or IGETC-CSU   37-39
Total Transferable Elective Units   3-5
Total Units for Degree   60

Please note: SDSU accepts this degree for students transferring into Mathematics (Science Emphasis) B.S.

II.   MATHEMATICS
Since jobs requiring mathematical skills such as data analysis, problem solving, pattern recognition, statistics, and probability are in high demand, the mathematics major may benefit both educationally and economically

from developing and pursuing an interest in mathematics. Mathematical skills and statistical methods are employed regularly by researchers testing hypotheses, by workers applying quality control in manufacturing, and by informed citizens who must evaluate information from the media in tabular, graphical, and report form in order to reach solutions. This major offers a foundation in these necessary skills. The emphasis is to prepare students for transfer to a four-year institution and/or for career preparation in a vocational or professional field.

Program Learning Outcomes

Upon successful completion of this program, students will be able to:
• Apply mathematical reasoning and problem solving strategies to analyze, interpret, and model applications in STEM or business programs.
• Select and apply appropriate definitions, postulates, and theorems to prove mathematical statements.

CAREER OPPORTUNITIES
* Accountant
* Actuary
  Air Traffic Controller
* Auditor
† Bank Officer
* Budget Analyst
  Computer Operator
* Computer Programmer
† Cost Estimator
† Credit and Collection Manager
  Data Processing Manager
* Economist
* Engineer
* Financial Planner
  Insurance Agent/Broker
  Insurance Claim Examiner
  Laboratory Examiner
  Loan Officer
* Market Research Analyst
* Mathematician
* Mathematics Teacher
* Securities Trader
  Semiconductor Technician
* Statistician
  Surveyor
* Systems Analyst

* Bachelor Degree or higher required
† Bachelor Degree normally recommended

Associate in Science Degree Requirements:

Course	Title	Units
MATH 180	Analytic Geometry and Calculus I	5
MATH 280	Analytic Geometry and Calculus II	4
MATH 281	Multivariable Calculus	4
		13

Select one of the following:

MATH 284	Linear Algebra	3
MATH 285	Differential Equations	3
		3

Select one of the following:

CS 181	Introduction to C++ Programming	3
ENGR 120	Engineering Computer Applications	3
MATH 160	Elementary Statistics	4
MATH 245	Discrete Math	3
PHYC 190	Mechanics and Heat	5
PHYC 200	Electricity and Magnetism	5
PHYC 210	Wave Motion and Modern Physics	5
		3-5

Total Required   19-21
Plus General Education Requirements

Recommended Electives: Students planning to transfer to four-year institutions to complete a bachelor's degree in Pure Mathematics, Applied Mathematics, or Statistics should select an emphasis in an applied discipline

such as accounting, chemistry, computer science, economics, engineering, or physics. In particular, transfer students are strongly urged to elect the following physics courses: PHYC 190, 200, 210. Students preparing for a vocational or professional career are strongly encouraged to select an emphasis in a vocational/professional discipline such as business, computer and information science, CADD technology, electronics technology, or environmental health and safety management.

Certificate of Achievement
Students who complete only the major requirements above qualify for a Certificate in Mathematics. An official request must be filed with the Admissions and Records Office prior to the deadline as stated in the Academic Calendar.

PHYSICS

Associate Degree for Transfer℠

I. PHYSICS FOR TRANSFER (AS-T)
Physics is the study of the relationship between matter and energy in the universe. The AS-T in Physics for Transfer degree is designed to prepare students to transfer to a California State University (CSU) with the intent of earning a baccalaureate degree in physics. The curriculum is designed to provide students working toward a bachelor's degree a well-balanced, lower division program by emphasizing fundamental concepts and problem solving. The degree requirements are typical of what baccalaureate institutions require.

The following is required for the AS-T in Physics for Transfer degree:

1. Minimum of 60 semester or 90 quarter CSU-transferable units.
2. Minimum grade point average (GPA) of at least 2.0 in all CSU-transferable coursework.
3. Minimum of 18 semester or 27 quarter units in the major.
4. A grade of "C" or better in all courses required for the major.
5. Certified completion of the Intersegmental General Education Transfer Curriculum (IGETC-CSU); see Degree Requirements and Transfer Information section for more information.

Program Learning Outcomes
Upon successful completion of this program, students will be able to:
- Evaluate derivatives of algebraic, trigonometric, logarithmic and exponential functions.
- Evaluate integrals using appropriate techniques (such as: by parts, trig substitution, etc.)
- Apply Green's, Stokes' and Gauss' Theorems.
- Use conservation of energy and conservation of momentum concepts.
- Use Maxwell's Equations to solve problems in electricity and magnetism.
- Use the basic concepts of modern physics: special relativity, photon behavior, matter waves, the uncertainty principles, and quantum mechanics in one and three dimensions, statistical physics and nuclear physics.

Associate in Science Degree Requirements:

Course	Title	Units
MATH 180	Analytic Geometry and Calculus I	5
MATH 280	Analytic Geometry and Calculus II	4
MATH 281	Multivariable Calculus	4
PHYC 190	Mechanics and Heat	5
PHYC 200	Electricity and Magnetism	5
PHYC 210	Wave Motion and Modern Physics	5
	Total Units for Major (7 units may be double-counted with GE)	28
	Total Units for IGETC-CSU	37
	Total Transferable Elective Units	2
	Total Units for Degree	60

Please note: SDSU accepts this degree for students transferring into the B.S. Physics (General) or B.S. Physics (Modern Optics Emphasis).

II. PHYSICS
Physics is the study of the relationship between matter and energy in the universe. The curriculum is designed to provide students working toward a bachelor's degree a well-balanced, lower division program by emphasizing fundamental concepts and problem solving. The degree requirements are typical of what four-year colleges and universities require; see www.assist.org for requirements of specific transfer institution.

Program Learning Outcomes
Upon successful completion of this program, students will be able to:
- Predict periodic trends in ionization energy, atomic size, electron affinity and acid-base properties.
- Calculate changes in enthalpy, entropy, and free energy for chemical reactions, phase changes, solution processes, and elementary molecular processes using tables of thermodynamic data.
- Write systematic names for carbon based compounds.
- Evaluate derivatives of algebraic, trigonometric, logarithmic and exponential functions.
- Evaluate integrals using appropriate techniques (such as: by parts, trig substitution, etc.)
- Apply Green's, Stokes' and Gauss' Theorems.
- Use conservation of energy and conservation of momentum concepts.
- Use Maxwell's Equations to solve problems in electricity and magnetism.
- Use the basic concepts of modern physics: special relativity, photon behavior, matter waves, the uncertainty principle, quantum mechanics in one and three dimensions, statistical physics and nuclear physics.

CAREER OPPORTUNITIES
  Air Pollution Operating Specialist
* Astronomer
* Astrophysicist
* Biomedical Engineer
* Biophysicist
* Chemical Physicist
  Consumer Safety Officer
* Cryogenic Engineer
  Electrician
  Food and Drug Inspector
* Fusion Engineer
* Geophysicist
  Government Claims Representative
  Health Program Representative
* High Energy Physicist
  Laser Specialist
* Metallurgist
* Meteorologist
* Nuclear Physicist
* Physical Oceanographer
* Physicist
* Plasma Physicist
  Quality Control Technician
* Quantum Physicist
* Seismologist
* Bachelor Degree or higher required

Associate in Science Degree Requirements:

Course	Title	Units
CHEM 141	General Chemistry I	5
CHEM 142	General Chemistry II	5
MATH 180	Analytical Geometry and Calculus I	5
MATH 280	Analytical Geometry and Calculus II	4
MATH 281	Multivariable Calculus	4
PHYC 190	Mechanics and Heat	5
PHYC 200	Electricity and Magnetism	5
PHYC 210	Wave Motion and Modern Physics	5
	Total Required	38
	Plus General Education Requirements	

UNIVERSITY STUDIES: SCIENCE AND MATHEMATICS

The Associate Degree in University Studies with an Area of Emphasis is intended to accommodate the differing requirements of a wide variety of transfer institutions and major options. Because admission and major preparation requirements vary at each four-year transfer institution, courses used to complete this degree should be selected with the assistance of a counselor. The completion of the University Studies Degree does not guarantee acceptance into either a baccalaureate major or a four-year institution.

REQUIREMENTS:

I. California State University (CSU) General Education Breadth
1. Complete CSU General Education Breadth (see Degree Requirements and Transfer Information section).
2. Earn a grade of "C" or better in 30 of the required 39 semester units of general education to include all courses in Area A and the Mathematical/Quantitative Reasoning courses in Area B.
3. Credit earned through external examinations, i.e., AP, will be applied towards general education in accordance with Cuyamaca College policies. Please note: This may be different than how the external exam is used on a CSU certification.
4. Complete a minimum of 18 units in an Area of Emphasis (listed below).
5. Complete a minimum of 60 degree applicable CSU transferable semester units.
6. Earn a cumulative GPA of 2.0 in all college course work completed.
7. Meet Cuyamaca College residence requirements for graduation (see Admission Information).

OR

II. Intersegmental General Education Transfer Curriculum (IGETC) for CSU or UC
1. Complete IGETC Certification (see Degree Requirements and Transfer Information section.
2. Earn a grade of "C" or better in all IGETC courses.
3. Credit earned through external examinations, i.e., AP, will be applied