NOTE: Online version contains updated Math and Statistics charts that were released after the 2019/20 ARC Catalog was printed.

Area: Mathematics
Dean: Gary Hartley (Interim)
Phone: (916) 484-8215
Counseling: (916) 484-8572

Degree: A.S. - Mathematics
A.S. - Physical Science/Mathematics
A.S. for Transfer - Mathematics

It is highly recommended that you review the prerequisite course material to enhance your chance of success. For suggested resources, see the Mathematics Department page on the campus' website: **arc.losrios.edu**

MATH 45, MATHS 72, MATHS 73, and MATHS 95 *(see June 2019 Addendum for new course listings)*

STAT 10 *(added per June 2019 Addendum)*

Mathematics Degree

Major Code: 011515A01

The A.S. degree in mathematics provides a foundation of mathematics for students in preparation for transfer to a four-year program in mathematics or statistics. Course work includes a three-semester calculus series, differential equations, linear algebra, and statistics and/or symbolic logic.

Student Learning Outcomes

Upon completion of this program, the student will be able to:

- identify, formulate, and solve applied problems (using calculus and linear algebra) in verbal, numeric, graphical, and symbolic form related to science, economics, or business.
- recognize and construct valid arguments using deductive and inductive reasoning skills.
- define and utilize terminology of mathematics with emphasis in calculus, linear algebra, and either statistics, logic or problem solving.
- calculate derivatives and integrals using a variety of defined rules and strategies of calculus, algebraic properties and trigonometric identities.

Requirements for Degree		**25 Units**
MATH 400	Calculus I	5
MATH 401	Calculus II	5
MATH 402	Calculus III	5
MATH 410	Introduction to Linear Algebra	3
MATH 420	Differential Equations	4
And a minimum of 3 units from the following:		3
MATH 320	Symbolic Logic (3)	
or PHIL 324	Symbolic Logic (3)	
STAT 300	Introduction to Probability and Statistics (4)	

Associate Degree Requirements: The Mathematics Associate in Science (A.S.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

Physical Science/Mathematics Degree

Major Code: 011228A01

This degree provides a broad study in the fields of physical science and mathematics. It is a good foundation for transfer to a four-year program in science, technology, engineering, or mathematics (STEM).

Student Learning Outcomes

Upon completion of this program, the student will be able to:

- recognize and utilize correctly the terminology of math, statistics and/or science.
- analyze and interpret data, charts and graphs using quantitative and qualitative methods.
- recognize and construct valid arguments using deductive and inductive reasoning.
- evaluate new and accepted ideas about the natural universe using testable methodology.

Career Opportunities

This program is intended to provide a broad foundation of skills and knowledge to help students succeed in the completion of a bachelor's degree in a variety of science, math or engineering-related areas.

Requirements for Degree		**18 Units**
A minimum of 18 units from the following:		18
ASTR	300, 310, 320, 330, 400, 481, 495, 499	
CHEM	305, 306, 309, 310, 400, 401, 420, 421, 423, 495, 499	
ENGR	300, 310, 312, 401, 413, 420, 495, 499	
GEOG	300, 301, 305, 306, 307, 308, 309, 391, 392, 393, 394, 495, 499	
GEOL	300, 301, 305, 306, 310, 311, 320, 325, 330, 331, 345, 390, 495, 499	
MATH	300, 310, 311, 320, 325, 330, 336, 340, 342, 355, 356, 370, 372, 373, 400, 401, 402, 410, 420, 480, 495, 499	
PHYS	310, 311, 312, 350, 360, 410, 421, 431, 495, 499	
PS	300, 301, 495, 499	
STAT	300, 305, 495, 499	

Associate Degree Requirements: The Physical Science/Mathematics Associate in Science (A.S.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

Mathematics A.S. for Transfer Degree

Major Code, CSU GE: 011514A01
Major Code, IGETC: 011514A02

This degree is designed to meet common lower-division requirements for a major in Mathematics at a CSU campus. Satisfactory completion of the ARC Mathematics transfer degree provides a solid foundation and satisfies the standard prerequisites for upper division coursework for Mathematics majors. However, it is highly recommended that students meet with a counselor since major and general education requirements vary for each college/university.

The Mathematics Associate in Science for Transfer (AS-T) Degree may be obtained by completion of 60 transferable, semester units with a minimum 2.0 GPA, including (a) the major or area of emphasis described in the Required Program outlined below (earning a C or better in these courses) and (b) either the Intersegmental General Education Transfer Curriculum (IGETC) or the California State University General Education Breadth Requirements.

Student Learning Outcomes

Upon completion of this program, the student will be able to:

- evaluate, describe, and apply single variable calculus including various forms of derivatives and integrals, to analyze and solve problems.
- evaluate, describe, and apply multivariate calculus, linear algebra, and differential equations to analyze and solve problems.
- prepare logical arguments and use them to prove basic mathematical theorems.
- solve real-world application problems using appropriate mathematical problem-solving skills.

Career Opportunities

Mathematicians work as statisticians, analysts, computer programmers, actuaries, researchers, planners, and educators. This transfer degree is designed to meet the common lower-division requirements for most bachelor's degrees in Mathematics.

Requirements for Degree		22 Units
MATH 400	Calculus I	5
MATH 401	Calculus II	5
MATH 402	Calculus III	5
MATH 410	Introduction to Linear Algebra	3
MATH 420	Differential Equations	4

Associate in Science for Transfer Degree Requirements: The Mathematics Associate in Science for Transfer (A.S.T.) Degree may be obtained by completion of 60 transferable, semester units with a minimum 2.0 GPA, including (a) the major or area of emphasis described in the Required Program, and (b) either the Intersegmental General Education Transfer Curriculum (IGETC) or the California State University General Education-Breadth Requirements.

Mathematics

MATH 10 Developing Confidence in Math 1 Unit

Advisory: Concurrent enrollment in another math course
Hours: 18 hours LEC

This course helps students recognize common misconceptions of mathematics, overcome math anxiety, and build confidence in math. Topics include relaxation techniques, study habits, and problem solving strategies. This course is also useful for tutors, counselors, and teachers interested in helping others overcome their math anxiety. Pass/No Pass only.

MATH 25 Computational Arithmetic 3 Units

Advisory: Placement through the math assessment process.
Hours: 54 hours LEC

This course introduces the fundamentals of arithmetic with an emphasis on computational skills. Topics include whole numbers, exponents, order of operations, factors, fractions, decimals, problem solving, and applications.

MATH 32 Pre-Algebra 3 Units

Prerequisite: MATH 24, 25, or 41 with a grade of "C" or better; or placement through the assessment process.
Hours: 54 hours LEC

This course briefly reviews the fundamentals of arithmetic, including fractions, decimals, and order of operations. Course content includes signed numbers, ratios, proportions, percent, concepts of variables, area/perimeter/volume of geometric figures, and solving basic linear equations.

MATH 41 Algebra Readiness - Part I 3 Units

Advisory: CISC 100, CISC 300, or CISC 305 with a grade of "C" or better, AND ENGRD 116 or ESLR 320 with a grade of "C" or better. Placement through the math assessment process.
Hours: 54 hours LEC

This course is the first of two parts covering algebra readiness in a mastery-based learning environment. The fundamentals of arithmetic are introduced, with an emphasis on problem solving and computational skills. Topics include whole numbers, exponents, order of operations, factors, fractions, decimals, proportion, ratios, rates, problem solving, and applications. The course is offered through the Multimedia Math Learning Center (MMLC), using an independent study approach under the direction of an instructor. Computer-based instruction via the Internet is an integral part of the course. Students are required to purchase a workbook that is bundled with the on-line video and math content system. One set of materials can be used for multiple MMLC courses, if completed in consecutive semesters. The content in the course is organized into various modules. Each module must be completed at a mastery level before the student moves on to the next. Students will demonstrate mastery by successfully completing assignments and then earning at least 80% on the module exam that is taken on-line in the MMLC. If necessary students will repeat the exam until mastery is achieved. All modules must be completed before the student takes the final exam, a comprehensive test on paper that is taken once and determines the majority of the course grade. Regular class attendance is required throughout the semester, including the mandatory orientation during the first class meeting. Students may also visit the MMLC during other hours of operation to receive tutoring, complete assignments, and take exams. This course may be completed as quickly as possible but no later than the end of the semester. Students who complete this course during the first half of the semester may sign up immediately for MATH 42. For the most updated information, please visit the MMLC web page on the ARC website. Completion of MATH 41 with a grade of "C" or better meets the prerequisite for MATH 42 and MATH 32.

MATH 42 Algebra Readiness - Part II 3 Units
Prerequisite: MATH 41 with a grade of "C" or better
Hours: 54 hours LEC

This course is the second of two parts covering algebra readiness in a mastery-based learning environment. The fundamentals of pre-algebra are introduced, with an emphasis on problem solving skills. Topics include order of operations, signed numbers, application problems, concepts of variables, exponents, operations on signed fractions, percent problems, solving algebraic equations, the rectangular coordinate system, introduction to graphing linear equations, applications of equations, and area/perimeter of geometric figures. The course is offered through the Multimedia Math Learning Center (MMLC), using an independent study approach under the direction of an instructor. Details about the program can be found in the catalog description for MATH 41. This course may be completed as quickly as possible but no later than the end of the semester. Students who complete this course during the first half of the semester may sign up immediately for MATH 131. For the most updated information, please visit the MMLC web page on the ARC website. Completion of MATH 41 AND MATH 42 with grades of "C" or better meets the prerequisite for MATH 131, MATH 100, MATH 103, MATH 129, and STAT 105.

MATH 100 Elementary Algebra 5 Units
Prerequisite: MATH 32, 39, or 42 with a grade of "C" or better; or placement through the assessment process.
Hours: 90 hours LEC

This course covers the fundamental concepts and operations of algebra and incorporates problem-solving skills. Topics include properties of real numbers, linear equations and inequalities, integer exponents, polynomials, and factoring polynomials. Other topics include rational and radical expressions, rational and radical equations, graphing and finding equations of lines, graphing and solving systems of linear equations, and graphing and solving quadratic equations.

MATH 110 Elementary Geometry 5 Units
Prerequisite: MATH 100, 104, or 132 with a grade of "C" or better, or placement through the assessment process.
Hours: 90 hours LEC

This course covers aspects of elementary geometry. Topics include geometric terms and definitions, properties of parallel lines and parallelograms, congruent and similar triangles, properties of triangles, right triangles, basic trigonometry, properties of circles, geometric constructions, areas, and volumes. The course also emphasizes problem-solving strategies, elementary logic, and writing proofs. (Competency: Mathematics)

MATH 120 Intermediate Algebra 5 Units
Prerequisite: MATH 100, 104, or 132 with a grade of "C" or better, or placement through the assessment process.
General Education: AA/AS Area II(b)
Hours: 90 hours LEC

This course extends and reviews the concepts of elementary algebra while incorporating applications and problem-solving skills. Reviewed and extended topics include linear and quadratic equations and their graphs, linear inequalities, systems of linear equations, exponents, factoring polynomials, rational expressions, and radicals. New topics include absolute value equations and inequalities, graphs of absolute value functions, equations of parallel and perpendicular lines, graphs of linear inequalities, graphs of systems of linear inequalities, functions, function notation, domain and range, inverse functions, exponential and logarithmic functions and their graphs, quadratic and polynomial functions and their graphs, an introduction to the complex number system, finding the real and complex solutions for a variety of equations, an introduction to conic sections, and nonlinear systems of equations and their graphs. (Competency: Mathematics)

MATH 125 Intermediate Algebra with Applications 4 Units
Prerequisite: MATH 100 or 132 with a grade of "C" or better, or placement through the assessment process.
General Education: AA/AS Area II(b)
Hours: 72 hours LEC

This is an intermediate algebra course for non-STEM students. Topics include linear functions, models, systems, and graphs, as well as polynomial, exponential, logarithmic, and quadratic functions. The course emphasizes authentic applications and mathematical models using real-world data. This course does not meet the prerequisite for STEM-track math courses. (Competency: Mathematics)

MATH 129 Elementary and Intermediate Algebra 9 Units
Prerequisite: MATH 32 or 42 with a grade of "C" or better, or placement through the assessment process.
General Education: AA/AS Area II(b)
Hours: 162 hours LEC

This course covers the concepts of elementary and intermediate algebra with an emphasis on problem solving. Topics include linear and quadratic equations, inequalities, factoring polynomials, rational expressions, exponents, radicals, graphing, and system of equations. Additional topics include graphs and their translations and reflections, functions, exponential and logarithmic functions, graphs of quadratic and polynomial functions, nonlinear systems of equations, polynomial and rational inequalities, and an introduction to conic sections. (Competency: Mathematics)

MATH 131 Combined Algebra - Part I 3 Units
Prerequisite: MATH 32, 39, or 42 with a grade of "C" or better; or placement through the assessment process.
Advisory: CISC 100, CISC 300, or CISC 305 with a grade of "C" or better, AND ENGRD 116 or ESLR 320 with a grade of "C" or better.
Hours: 54 hours LEC

This course is the first of three parts covering combined algebra in a mastery-based learning environment. Problem-solving skills are emphasized throughout the course. Topics include linear equations and inequalities, integer exponents, polynomials, systems of linear equations, the rectangular coordinate system, graphs and equations of lines, and related applications. The course is offered through the Multimedia Math Learning Center (MMLC), using an independent study approach under the direction of an instructor. Computer-based instruction via the Internet is an integral part of the course. Students are required to purchase a workbook that is bundled with the on-line video and math content system. One set of materials can be used for multiple MMLC courses, if completed in consecutive semesters. The content in the course is organized into various modules. Each module must be completed at a mastery level before the student moves on to the next. Students will demonstrate mastery by successfully completing assignments and then earning at least 80% on the module exam that is taken on-line in the MMLC. If necessary students will repeat the exam until mastery is achieved. All modules must be completed before the student takes the final exam, a comprehensive test on paper that is taken once and determines the majority of the course grade. Regular class attendance is required throughout the semester, including the mandatory orientation during the first class meeting. Students may also visit the MMLC during other hours of operation to receive tutoring, complete assignments, and take exams. This course may be completed as quickly as possible but no later than the end of the semester. Students who complete this course during the first half of the semester may sign up immediately for MATH 132. For the most updated information, please visit the MMLC web page on the ARC website. Completion of MATH 131 AND MATH 132 with grades of "C" or better meets the prerequisite for MATH 133, MATH 110, MATH 120, and MATH 125.

MATH 132 Combined Algebra - Part II 3 Units
Prerequisite: MATH 131 with a grade of "C" or better
Hours: 54 hours LEC

This course is the second of three parts covering combined algebra in a mastery-based learning environment. Problem-solving skills are emphasized throughout the course. Topics include polynomial factorization, rational expressions and equations, radical expressions and equations, rational exponents, and related applications. The course is offered through the Multimedia Math Learning Center (MMLC), using an independent study approach under the direction of an instructor. Details about the program can be found in the catalog description for MATH 131. This course may be completed as quickly as possible but no later than the end of the semester. Students who complete this course during the first half of the semester may sign up immediately for MATH 133. For the most updated information, please visit the MMLC web page on the ARC website. Completion of MATH 131 AND MATH 132 with grades of "C" or better meets the prerequisite for MATH 133, MATH 110, MATH 120, and MATH 125.

MATH 133 Combined Algebra - Part III 3 Units
Prerequisite: MATH 132 with a grade of "C" or better
General Education: AA/AS Area II(b) (effective Summer 2013)
Hours: 54 hours LEC

This course is the third of three parts covering combined algebra in a mastery-based learning environment. Problem-solving skills are emphasized throughout the course. Topics include function evaluation and notation, inverse functions, solving quadratic equations, complex numbers, graphs of quadratic functions, exponential and logarithmic functions, properties of logarithms, conic sections, and related applications. The course is offered through the Multimedia Math Learning Center (MMLC), using an independent study approach under the direction of an instructor. Details about the program can be found in the catalog description for MATH 131. This course may be completed as quickly as possible but no later than the end of the semester. For the most updated information, please visit the MMLC web page on the ARC website. Completion of MATH 131, MATH 132, AND MATH 133 with grades of "C" or better is equivalent to the completion of MATH 120 or MATH 125 or MATH 129.

MATH 145 Mathematics for the Trades 1.5 Units
Hours: 23 hours LEC; 12 hours LAB

This course introduces mathematics applicable to technical programs of study. Topics include the use of mathematical operators on whole numbers, fractions, and decimals. Additional content includes fundamentals of algebra, basic geometry, and triangle trigonometry. This course is intended for those in Pre-Apprenticeship programs or other technical educational programs. Completion of this course does not fulfill any prerequisites for any course, including MATH courses, at American River College.

MATH 295 Independent Studies in Mathematics 1-3 Units
Hours: 54-162 hours LAB

Independent Study is an opportunity for the student to extend classroom experience in this subject, while working independently of a formal classroom situation. Independent study is an extension of work offered in a specific class in the college catalog. To be eligible for independent study, students must have completed the basic regular catalog course at American River College. They must also discuss the study with a professor in this subject and secure approval. Only one independent study for each catalog course will be allowed.

MATH 300 Introduction to Mathematical Ideas 3 Units
Prerequisite: MATH 120, 124, 125, 129, or 133 with a grade of "C" or better, or placement through the assessment process.
General Education: AA/AS Area II(b); CSU Area B4; IGETC Area 2
Course Transferable to UC/CSU
Hours: 54 hours LEC

This course makes fundamental concepts and processes more meaningful for non-mathematics majors through a study of several mathematical topics, including the history of mathematics, numeration systems, logic, geometry, algebraic modeling, combinatorics, probability, statistics, sets, matrices, consumer mathematics, equations and inequalities, functions and graphs, problem solving, graph theory, voting and apportionment, and number theory. This course is not recommended for students entering elementary school teaching or business administration majors. (Competency: Mathematics)

MATH 310 Mathematical Discovery 3 Units
Prerequisite: MATH 110 with a grade of "C" or better or successful completion of high school geometry, AND MATH 120, 125, 129, or 133 with a "C" or better, or placement through the assessment process. Geometry is the only high school course that can be used to meet the prerequisite.
General Education: AA/AS Area II(b); CSU Area B4
Course Transferable to UC/CSU
Hours: 54 hours LEC

This course explores mathematical patterns and relations as well as the formulation and proof of conjectures. Topics from number theory, probability and statistics, and geometry are investigated. This course is recommended for students interested in a degree in education. (Competency: Mathematics)

MATH 311 Mathematical Concepts for Elementary School Teachers - Number Systems 3 Units
Prerequisite: MATH 120, 125, 129, or 133 with a grade of "C" or better, or placement through the assessment process.
General Education: AA/AS Area II(b); CSU Area B4
Course Transferable to UC/CSU
Hours: 54 hours LEC

This course focuses on the development of quantitative reasoning skills through in-depth, integrated explorations of topics in mathematics, including history of real number systems and subsystems, basic number theory, sets and relations, logic, mathematical induction, and current national and state curriculum standards for mathematics. It emphasizes comprehension and critical analysis of mathematical concepts and applications of logical reasoning. (C-ID MATH 120; Competency: Mathematics)

MATH 320 Symbolic Logic 3 Units
Same As: PHIL 324
Prerequisite: MATH 120, 125, 129, or 133 with a grade of "C" or better, or placement through the assessment process.
General Education: AA/AS Area II(b)
Course Transferable to UC/CSU
Hours: 54 hours LEC

This course is an introduction to symbolic logic. It includes a study of the logic of sentences (propositional logic) and the logic of classes and relations (predicate logic), together with an introduction to the nature of deductive systems. This course is not open to students who have completed PHIL 324. (C-ID PHIL 210; Competency: Mathematics)

MATH 325 Problem-Solving 3 Units
Prerequisite: MATH 120, 125, 129, or 133 with a grade of "C" or better, or placement through the assessment process.
General Education: AA/AS Area II(b); CSU Area B4
Course Transferable to CSU
Hours: 54 hours LEC

This course focuses on the development of specific strategies and skills necessary to solve real-world and advanced mathematics problems. It emphasizes the development of logical, organizational, and divergent thinking, as well as written and oral communication skills, individual and group work, and clear presentation of mathematical work. Topics include drawing a diagram, eliminating possibilities, making a systematic list, looking for a pattern, guessing and checking, solving an easier related problem, working backwards, using algebraic representation, and applying the method of finite differences. (Competency: Mathematics)

MATH 330 Trigonometry 3 Units
Prerequisite: MATH 120, 129, or 133 with a grade of "C" or better, or placement through the assessment process.
Advisory: MATH 110; or completion of high school geometry
General Education: AA/AS Area II(b); CSU Area B4
Course Transferable to CSU
Hours: 54 hours LEC

This course covers the fundamentals of trigonometry and its applications. Topics include degree and radian measurements of angles, right triangle trigonometry, unit circle trigonometry, graphs of trigonometric functions, algebraic manipulation and proof of trigonometric identities, inverse trigonometric functions, solving trigonometric equations, the Laws of Sines and Cosines, vectors, the polar coordinate system, and roots and powers of complex numbers (De Moivre's Theorem). This course is not open to students who have completed MATH 373, Trigonometry for Calculus. (C-ID MATH 851; Competency: Mathematics)

MATH 336 College Algebra 5 Units
Prerequisite: MATH 120, 124, 129, or 133 with a grade of "C" or better, or placement through the assessment process.
General Education: AA/AS Area II(b); CSU Area B4; IGETC Area 2
Course Transferable to UC/CSU
Hours: 90 hours LEC

This course reviews and covers topics beyond those studied in intermediate algebra, including functions, matrices, The Rational Root Theorem, partial fractions, sequences and series, mathematical induction, and The Binomial Theorem. It focuses on applications and graphing of polynomial, logarithmic, and exponential functions, as well as solving systems of linear and non-linear equations and inequalities. It also covers analytic geometry, including straight lines, conic sections, and curve sketching. (C-ID MATH 150; Competency: Mathematics)

MATH 340 Calculus for Business and Economics 3 Units
Prerequisite: MATH 120, 129, or 133 with a grade of "C" or better, or placement through the assessment process.
General Education: AA/AS Area II(b); CSU Area B4; IGETC Area 2
Course Transferable to UC/CSU
Hours: 54 hours LEC

This course introduces how differential calculus and integral calculus are used in the fields of business, economics, social science, and biological science. Topics include finding limits, applying various rules to find derivatives of polynomial, rational, exponential, and logarithmic functions, as well as using derivatives to analyze marginal cost, revenue, and profit. It is not recommended for mathematics and physical science majors. (C-ID MATH 140; Competency: Mathematics)

MATH 342 Modern Business Mathematics 3 Units
Prerequisite: MATH 120, 124, 129, or 133 with a grade of "C" or better, or placement through the assessment process.
General Education: AA/AS Area II(b); CSU Area B4; IGETC Area 2
Course Transferable to UC/CSU
Hours: 54 hours LEC

This course is designed around applications of mathematics in economic and business contexts. Specific topics include functions and related business formulas, tables and graphs, finance (interest and exponential models in economics), rates of change, including applications and optimization, and linear programming. (Competency: Mathematics)

MATH 355 Calculus for Biology and Medicine I 4 Units
Prerequisite: MATH 330 or 373 with a grade of "C" or better, or placement through the assessment process.
Advisory: MATH 370
General Education: AA/AS Area II(b); CSU Area B4; IGETC Area 2
Course Transferable to UC/CSU
Hours: 72 hours LEC

This course is an introduction to differential calculus and elementary differential equations via applications in biology and medicine. It covers limits, derivatives of polynomials, trigonometric and exponential functions, graphing, and applications of the derivative to biology and medicine. Topics include the Fundamental Theorem of Calculus and techniques of integration, including integral tables and numerical methods. (Competency: Mathematics)

MATH 356 Calculus for Biology and Medicine II 4 Units
Prerequisite: MATH 355 with a grade of "C" or better
General Education: AA/AS Area II(b); CSU Area B4
Course Transferable to UC/CSU
Hours: 72 hours LEC

This course covers matrix algebra with eigenvalues and eigenvectors, systems of linear equations, functions of several variables, partial derivatives, systems of differential equations, and applications to biology and medicine. This course is a superset of MATH 351, treating additional topics and covering them in more depth. (Competency: Mathematics)

MATH 370 Pre-Calculus Mathematics 5 Units
Prerequisite: MATH 330 or 373 with a grade of "C" or better, or placement through the assessment process.
General Education: AA/AS Area II(b); CSU Area B4; IGETC Area 2
Course Transferable to UC/CSU
Hours: 90 hours LEC

This course provides foundational mathematics and problems that require critical thinking in preparation for the calculus sequence for science, technology, engineering, and mathematics (STEM) majors. Topics include rigorous treatment of polynomial, rational, logarithmic, exponential, and trigonometric functions, including graphing and applications, as well as systems of linear and non-linear equations and inequalities. This course also covers analytic geometry, conic sections, vectors, parametric equations, and polar equations. (C-ID MATH 155; Competency: Mathematics)

Mathematics & Statistics Courses

AA DEGREE/ REMEDIATION/NON-TRANSFERABLE/NON-DEGREE

Lecture Series Pathway

ENTRY POINT
MATH 100 (5 units) *Elementary Algebra*
→ or
ENTRY POINT
MATH 110 (5 units) *Elementary Geometry*
or
MATH 120 (5 units) *Intermediate Algebra*

Personalized Learning Pathway

ENTRY POINT
MATH 41 (3 units) *Algebra Readiness - Part I*
→ **MATH 42** (3 units) *Algebra Readiness - Part II*
ENTRY POINT
→ **MATH 131** (3 units) *Combined Algebra - Part I*
→ **MATH 132** (3 units) *Combined Algebra - Part II*
→ **MATH 133** (3 units) *Combined Algebra - Part III*

Accelerated Pathways

ENTRY POINT
MATH 41* (3 units) *Algebra Readiness - Part I*
& **MATH 42*** (3 units) *Algebra Readiness - Part II*
→
ENTRY POINT
MATH 131* (3 units) *Combined Algebra - Part I*
& **MATH 132*** (3 units) *Combined Algebra - Part II*
→ **MATH 133** (3 units) *Combined Algebra - Part III*
or
MATH 129 (9 units) *Elementary & Intermediate Algebra*

* Classes can be taken in the same semester but not concurrently.

SLAM PLACEMENT — STATISTICS AND LIBERAL ARTS MATH

Statistics Pathway

STAT 300 (4 units) *Intro. to Probability & Statistics*
or
STAT 300 (4 units) *Intro. to Probability & Statistics* & **STAT 10◆** (2 units) *Support for Intro. to Probability & Statistics*
MUST BE TAKEN CONCURRENTLY
or
STAT 105 (6 units) *Statway Part I* → **STAT 305** (6 units) *Statway Part II*
Both courses are required to meet the transfer level equivalent of STAT 300.
or
STAT 480 (4 units) *Intro. to Probability & Statistics - Honors*

Liberal Arts Math Pathway

MATH 300 (3 units) *Intro. to Math Ideas*
or
MATH 300 (3 units) *Intro. to Math Ideas* & **MATHS 95◆** (2 units) *Support for Intro. to Math Ideas*
MUST BE TAKEN CONCURRENTLY
or
MATH 325 (3 units) *Problem Solving*

◆ *SUPPORT COURSES OFFERED BEGINNING IN FALL 2019*

NOTE:
MATH 110, 120, 129 and 133 meet the ARC Graduation competency requirements for math.
Please see a counselor for math course selection that best meets your individual needs.

Mathematics & Statistics Courses

BSTEM PLACEMENT

BUSINESS | SCIENCE | TECHNOLOGY | ENGINEERING | MATH

Education / Business / Other Pathways

CHOOSE ONE

- **MATH 310** (3 units) *Math Discovery*
- or **MATH 311** (3 units) *Math Concepts for School Teachers*
- or **MATH 320** (3 units) *Intro. to Symbolic Logic*
- or **MATH 340** (3 units) *Calculus for Business*
- or **MATH 342** (3 units) *Modern Business Math*
- or **MATH 340** or **MATH 342** & **MATHS 45◆** (2 units) *Support for Business Mathematics*

MUST BE TAKEN CONCURRENTLY

Calculus Pathway

MATH 370 has a Trigonometry prerequisite

- **MATH 370** (5 units) *Precalculus*

or

MATH 372 and 373 can be taken in any order or Concurrently in one semester.

- **MATH 372** (4 units) *College Algebra for Calculus*
- **MATH 373** (4 units) *Trigonometry for Calculus*

or

MUST BE TAKEN CONCURRENTLY

- **MATH 372** (4 units) *College Algebra for Calculus* & **MATHS 72◆** (2 units) *Support for College Algebra for Calculus*

MUST BE TAKEN CONCURRENTLY

- **MATH 373** (4 units) *Trigonometry for Calculus* & **MATHS 73◆** (2 units) *Support for Trigonometry for Calculus*

RECOMMENDED

- **MATH 400** (5 units) *Calculus I*
- **MATH 401** (5 units) *Calculus II*
- **MATH 402** (5 units) *Calculus III*
- or **MATH 410** (3 units) *Linear Algebra*
- or **MATH 420** (4 units) *Differential Equations*

Biology and Medicine Calculus Pathway

- **MATH 373** (4 units) *Trigonometry for Calculus*

or

MUST BE TAKEN CONCURRENTLY

- **MATH 373** (4 units) *Trigonometry for Calculus* & **MATHS 73◆** (2 units) *Support for Trigonometry for Calculus*

- **MATH 355** (4 units) *Calculus for Biology & Medicine I*
- **MATH 356** (4 units) *Calculus for Biology & Medicine II*

MATH 355 and 356 may not be accepted by all Biology/Medicine programs.
MATH 370 is an Advised Prerequisite.

◆ *SUPPORT COURSES OFFERED BEGINNING IN FALL 2019*

NOTE:
MATH 120, 129, 133 each satisfy the Intermediate Algebra prerequisite.
Please see a counselor for math course selection that best meets your individual needs.

MATH 372 College Algebra for Calculus 4 Units
Prerequisite: MATH 120, 129, or 133 with a grade of "C" or better, or placement through the assessment process.
General Education: AA/AS Area II(b) (effective Summer 2018); CSU Area B4 (effective Fall 2018); IGETC Area 2 (effective Fall 2018)
Course Transferable to UC/CSU
Hours: 72 hours LEC

This course provides a rigorous treatment of college-level algebra and its applications, with a particular focus on preparing students for the calculus sequence for Science, Technology, Engineering, and Mathematics (STEM) majors. Topics include polynomial, rational, radical, exponential, absolute value, and logarithmic functions, graphs, and equations; systems of equations; the theory of polynomial equations; analytic geometry including conics; and an introduction to sequences and series. Emphasis is given to analytical reasoning and problem-solving. This course may be taken concurrently with MATH 373, Trigonometry for Calculus. Completion of both MATH 372 AND MATH 373 with grades of "C" or better meets the prerequisite for MATH 400, Calculus I. (Competency: Mathematics (effective Summer 2018))

MATH 373 Trigonometry for Calculus 4 Units
Prerequisite: MATH 120, 129, or 133 with a grade of "C" or better, or placement through the assessment process.
Advisory: MATH 110; or completion of high school geometry
General Education: AA/AS Area II(b) (effective Summer 2018); CSU Area B4 (effective Fall 2018)
Course Transferable to CSU
Hours: 72 hours LEC

This course provides a rigorous treatment of trigonometry and its applications, with a particular focus on preparing students for the calculus sequence for science, technology, engineering, and mathematics (STEM) majors. Emphasis is given to the study of trigonometric functions from numerical, graphical, and algebraic descriptions. Topics include functions and their graphs, transformations of functions, geometric properties of circles and triangles, degree and radian measurements of angles, right triangle trigonometry, reference angle trigonometry, unit circle trigonometry, graphs and transformations of trigonometric functions, verifying and applying trigonometric identities, inverse trigonometric functions, solving trigonometric equations, solving triangles using the Law of Sines and the Law of Cosines, vectors, the polar coordinate system, and roots and powers of complex numbers including De Moivre's Theorem. This course may be taken concurrently with MATH 372, College Algebra for Calculus. Completion of both MATH 372 AND MATH 373 with grades of "C" or better meets the prerequisite for MATH 400, Calculus I. (Competency: Mathematics (effective Summer 2018))

MATH 400 Calculus I 5 Units
Prerequisite: MATH 370 (Pre-Calculus Mathematics), OR MATH 372 (College Algebra for Calculus) AND MATH 373 (Trigonometry for Calculus) with grades of "C" or better, or placement through the assessment process.
General Education: AA/AS Area II(b); CSU Area B4; IGETC Area 2
Course Transferable to UC/CSU
Hours: 90 hours LEC

This course is an introduction to differential and integral calculus. It covers limits, continuity, differentiation and integration of algebraic, trigonometric, logarithmic, exponential, and other transcendental functions. Some applications are also covered. (C-ID MATH 210; Part of C-ID MATH 900S; Competency: Mathematics)

MATH 401 Calculus II 5 Units
Prerequisite: MATH 400 with a grade of "C" or better
General Education: CSU Area B4; IGETC Area 2
Course Transferable to UC/CSU
Hours: 90 hours LEC

This course is a continuation of MATH 400. It builds on the methods of integration learned in MATH 400, and also covers improper integrals, sequences, infinite series, power series, polar coordinates, and parametric and polar equations. Many calculus applications are also included. (C-ID MATH 220; Part of C-ID MATH 900S; Competency: Mathematics)

MATH 402 Calculus III 5 Units
Prerequisite: MATH 401 with a grade of "C" or better
General Education: CSU Area B4; IGETC Area 2
Course Transferable to UC/CSU
Hours: 90 hours LEC

This course is a continuation of MATH 401. It extends the concepts of limits, derivatives, and integrals to vector-valued functions and multivariate functions. The topics include multivariate functions, partial derivatives, extrema of multivariate functions, iterated integrals, development of vector calculus, line integrals, three-dimensional analytic geometry, and Green's, Gauss' (Divergence), and Stokes' Theorems. Many applications of calculus are also covered. (C-ID MATH 230; Competency: Mathematics)

MATH 410 Introduction to Linear Algebra 3 Units
Prerequisite: MATH 401 with a grade of "C" or better
Advisory: MATH 402
General Education: CSU Area B4; IGETC Area 2
Course Transferable to UC/CSU
Hours: 54 hours LEC

This course provides an introduction to linear algebra including matrices, determinants, vector spaces, inner product spaces, linear transformations, and eigenvectors. It is intended for majors in mathematics, engineering, economics, science, and related fields. This course emphasizes cogent reasoning, mathematical proof, and problem solving. (C-ID MATH 250; Part of C-ID MATH 910S; Competency: Mathematics)

MATH 420 Differential Equations 4 Units
Prerequisite: MATH 401 with a grade of "C" or better
Advisory: MATH 402
General Education: CSU Area B4; IGETC Area 2
Course Transferable to UC/CSU
Hours: 72 hours LEC

This course is a study of ordinary differential equations, including linear equations, systems of equations, equations with variable coefficients, existence and uniqueness of solutions, series solutions, singular points, transform methods, boundary value problems, and applications. (C-ID MATH 240; Part of C-ID MATH 910S; Competency: Mathematics)

MATH 480 Honors Seminar in Mathematics 1 Unit
Prerequisite: MATH 370 with a grade of "C" or better
Course Transferable to UC/CSU
Hours: 18 hours LEC

Honors Seminar in Mathematics is a one-unit intensive course. The course is taught in a seminar format where work is done independently in pursuit of solutions to challenging problems in mathematics in consultation with the instructor. Seminar participants will explore strategies and techniques for solving problems and present their solutions to the class.

MATH 495 Independent Studies in Mathematics 1-3 Units

Course Transferable to CSU
Hours: 54-162 hours LAB

Independent Study is an opportunity for the student to extend classroom experience in this subject, while working independently of a formal classroom situation. Independent study is an extension of work offered in a specific class in the college catalog. To be eligible for independent study, students must have completed the basic regular catalog course at American River College. They must also discuss the study with a professor in this subject and secure approval. Only one independent study for each catalog course will be allowed.

Statistics

STAT 10 Support for Introduction to Probability and Statistics 2 Units

Hours: 36 hours LEC

This course provides intensive instruction and practice in the core mathematical skills, competencies, and concepts necessary for success in STAT 300 (Introduction to Probability and Statistics). Students taking this course must be concurrently enrolled in the corresponding section of STAT 300. The content of this course is designed to help students develop effective learning strategies, and to provide arithmetic, algebraic, and geometric support as they learn concepts in the statistics course. Topics and homework assignments are often connected to assignments in the statistics course. Support using the required statistical technology package is also included. This course is graded Pass/No Pass.

STAT 105 Statway, Part I 6 Units

Prerequisite: MATH 32 or 42 with a grade of "C" or better, or placement through the assessment process.
Advisory: Eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.
Hours: 108 hours LEC

This is the first semester of a two-semester course that introduces the concepts of probability and statistics with requisite arithmetic and algebraic topics integrated throughout. It is structured to serve students planning to transfer and continue studies in humanities or social sciences. Statistics topics emphasize data analysis and include methods for collecting data, graphical and numerical descriptive statistics, correlation, linear regression, simple exponential regression, and introduction to probability. Algebra topics include proportional relationships (including variation) with applications, expressions, linear equations and systems with applications, functions, quadratic and exponential equations, and linear and exponential models. Learning strategies for success with an emphasis on study skills, resource acquisition, and maintaining a positive perspective towards learning are also discussed and applied.

STAT 300 Introduction to Probability and Statistics 4 Units

Prerequisite: MATH 120, 125, 129, or 133 with a grade of "C" or better, or placement through the assessment process.
General Education: AA/AS Area II(b); CSU Area B4; IGETC Area 2
Course Transferable to UC/CSU
Hours: 72 hours LEC

This course is an introduction to probability and statistics. Topics include elementary principles and applications of descriptive statistics, counting principles, elementary probability principles, probability distributions, estimation of parameters, hypothesis testing, linear regression and correlation, and Analysis of Variance (ANOVA). Applications use data from various disciplines including business, social sciences, psychology, life and health sciences, and education. Statistical analysis using a computer statistics package or graphing calculator is required. (C-ID MATH 110; Competency: Mathematics)

STAT 305 Statway, Part II 6 Units

Prerequisite: STAT 105 with a grade of "C" or better
General Education: AA/AS Area II(b); CSU Area B4; IGETC Area 2
Course Transferable to UC/CSU
Hours: 108 hours LEC

This is the second semester of a two-semester course that introduces the concepts of probability and statistics with requisite arithmetic and algebraic topics integrated throughout. It is structured to serve students planning to transfer and continue studies in humanities or social sciences. Statistics topics emphasize data analysis and include basic concepts of probability; confidence intervals; hypothesis tests for means, proportions, and variance; chi-squared tests; and ANOVA (Analysis of Variance). Algebra topics include proportional relationships (including variation) with applications, expressions, linear equations and systems with applications, functions, quadratic and exponential equations, and linear and exponential/logarithmic models. Learning strategies for success with an emphasis on study skills, resource acquisition, and maintaining a positive perspective towards learning are also discussed and applied. Both parts of Statway must be completed with a grade of "C" or better to receive credit for transfer-level statistics. (Competency: Mathematics)

STAT 480 Introduction to Probability and Statistics - Honors 4 Units

Prerequisite: MATH 120, 125, 129, or 133 with a grade of "C" or better, or placement through the assessment process.
Advisory: Placement into ENGWR 300.
Course Transferable to CSU
Hours: 72 hours LEC

This course is an introduction to probability and statistics designed for students in the honors program. Topics include elementary principles and applications of descriptive statistics, counting principles, elementary probability principles, probability distributions, estimation of parameters, hypothesis testing, linear regression and correlation, and Analysis of Variance (ANOVA). Applications use data from various disciplines including business, social sciences, psychology, life and health sciences, and education. Statistical analysis using a computer statistics package is required. This honors section uses an intensive instructional methodology designed to challenge motivated students, and includes a capstone project. This course is not open to students who have completed STAT 300.

STAT 495 Independent Studies in Statistics 1-3 Units

Prerequisite: None
Course Transferable to CSU
Hours: 54-162 hours LAB

Independent Study is an opportunity for the student to extend classroom experience in this subject, while working independently of a formal classroom situation. Independent study is an extension of work offered in a specific class in the college catalog. To be eligible for independent study, students must have completed the basic regular catalog course at American River College. They must also discuss the study with a professor in this subject and secure approval. Only one independent study for each catalog course will be allowed.