

# MATHEMATICS

## Career Opportunities

(Most careers require bachelors or advanced degrees)

Mathematician	Systems Analyst
Programmer	Operations Research Analyst
Statistician	Applied Science Programmer
Actuary	

## Faculty

### Full-Time

John Andrich	Mark Bates
Bret Black	Michael Bowen
Hussein Fahs	Alan Hayashi
David Magallanes	Maria Parker
Colleen Ryan	Lilia Zambrano

### Part-Time

Louise Bretz	James De Smet
Roland Handy	Maricruz Hernandez
Jim Ingersoll	Thomas Janssens
Ulisses Lastra	Bill Mandras
John Norbutas	Gary Rigsby
Mamerta Santiago	Hugo Viveros
Myung Yun	

## Mathematics

### Associate in Arts Degree

Required Courses:	Units	
MATH R120	Calculus with Analytic Geometry I	5
MATH R121	Calculus with Analytic Geometry II	5
MATH R122	Calculus with Analytic Geometry III	5
MATH R125	Differential Equations with Linear Algebra	5
CSR110	Programming with JAVA	4
		24

### Additional Requirement:

Complete a minimum of nine (9) units from the following:

	Units	
MATH R105	Introductory Statistics	4
PHYS R131	Physics for Scientists and Engineers 1	5
PHYS R132	Physics for Scientists and Engineers 2	5
PHYS R133	Physics for Scientists and Engineers 3	5
CHEM R120	General Chemistry I	5
CSR115	Programming C++	4
		9-10

**Total Required Units 33-34**

## Mathematics Courses

### MATH R008—Lab-Based Beginning Math 3 units

2 hours lecture, 3 hours lab weekly

This course starts with addition and multiplication facts for whole numbers. The course covers operations (addition, subtraction, multiplication, and division) using positive whole numbers, operations with fractions, operations with decimals, and a brief introduction to percentages. The course proceeds at a slower pace than MATH R009 and includes laboratory time in which the student works problems supervised by the instructor. The instructor may use various learning aids, such as videotapes, computer programs, and/or objects that can be manipulated to demonstrate facts. Not applicable for degree credit. Course may be taken two times. (2)

### MATH R009—Basic Mathematics 3 units

3 hours lecture weekly

Review of basic mathematical skills and fundamental operations as applied to integer, common and decimal fractions, and percentages;

emphasis on understanding of arithmetic and mathematical processes. Not applicable for degree credit. Course may be taken two times. (2)

### MATH R010—Pre-Algebra 4 units

Advisory: MATH R008, or MATH R009.

4 hours lecture weekly

This course bridges the gap between arithmetic and elementary algebra. It reviews whole numbers, introduces algebra, reviews fractions and mixed numbers, introduces solving equations and grouping, and examines decimals, proportions, unit analysis, and percent. It also introduces graphing straight lines and interpreting other graphs. Proper notation, word problems, calculator use, and study skills will be emphasized. Not applicable for degree credit. Course may be taken two times. (2)

### MATH R011—Elementary Algebra 5 units

Prerequisites: MATH R010.

5 hours lecture weekly

This is a first course in algebra. The topics will include: operations with counting numbers, integers, rational, and real numbers; linear equations and inequalities; graphing in one and two dimensions; ratio, proportion; laws of exponents; operations with polynomials; rational expressions; factoring; systems of linear equations; and quadratic equations. (2)

### MATH R011P—Elementary Algebra Problem Solving 1 unit

Prerequisites: MATH R011 or concurrent enrollment.

1 hour lecture weekly

Course is a problem-solving session to accompany MATH R011. It gives students the chance to gain a greater mastery of the topics covered in MATH R011 by providing additional discussion and problem-solving opportunities. It also gives students a richer experience in elementary algebra by introducing supplementary topics related to the core material of MATH R011. This course may also include appropriate topics from the history of mathematics and opportunities to use a computer in solving algebra and related problems. Course may be taken two times. (2)

### MATH R014—Intermediate Algebra 5 units

Prerequisites: MATH R011.

5 hours lecture weekly

This is a second course in algebra emphasizing applications of mathematics to scientific and logical problems. Students learn to analyze and interpret problems, develop inductive and deductive logic abilities and apply these skills to solutions of verbal and quantitative problems. The topics include solutions of systems of linear equations; functions; graphing of linear and non-linear functions; complex numbers; radical expressions and equations; solutions of equations of higher degree; rational expressions and equations; exponential and logarithmic functions; conic sections; sequences and series. (2)

### MATH R014P—Intermediate Algebra Problem Solving 1 unit

Prerequisites: MATH R014 or concurrent enrollment.

1 hour lecture weekly

Course is a problem-solving session to accompany MATH R014. It gives students the chance to gain a greater mastery of the topics covered in MATH R014 by providing additional discussion and problem-solving opportunities. It also gives students a richer experience in intermediate algebra by introducing supplementary topics related to the core material of MATH R014. This course may also include appropriate topics from the history of mathematics and opportunities to use a computer in solving algebra and related problems. Course may be taken two times. (2)

### MATH R093—Overcoming Math Anxiety 1 unit

1 hour lecture weekly

This course is intended to help students overcome anxieties and fears of mathematics so they can achieve their personal goals in areas that require mathematics. Topics include discussion of common myths, self-awareness, setting realistic expectations, strategies to deal with and decrease anxieties, and applying reading and study skills unique to mathematics. Field trips may be required. Not applicable for degree credit. (2)

### MATH R098—Short Courses in Mathematics 1/2-10 units

(1) = Credit/No Credit only (2) = Credit/No Credit at student's option

Lecture and/or lab hours as required by unit formula

Short Courses in Mathematics provides courses in selected areas of mathematics to meet specific needs of the college or the community when those needs are not met by regular course offerings. The length of the course will determine the unit credit. Field trips may be required. (2)

**MATH R100L—Computer-Assisted Laboratory 1 unit**

Prerequisites: MATH R014.

3 hours lab weekly

This course is meant to serve as a computer supplement to any 100-level mathematics class. The student uses the computer as a tool, allowing access to software relevant to the class currently being taken. The student may become involved in drill work, projects, exercises, math or science games, or other training activities. This class affords students an opportunity to deepen their knowledge to an extent not possible in the regularly allotted class time. Materials fee is required. Course may be taken four times. This course does not satisfy the laboratory science requirement for the AA/AS degree. (Same as PHSC R100L) (2)

Transfer credit: CSU

**MATH R101—Mathematics for the Liberal Arts Major 3 units**

Prerequisites: MATH R014.

3 hours lecture weekly

Course gives the Liberal Arts major a better understanding of the deductive process and the nature of mathematics. Course will explore character and origin of various mathematics subject fields. (2)

Transfer credit: CSU (CAN: MATH 2)

**MATH R102—Math for Elementary Teachers 4 units**

Prerequisites: MATH R014.

3 hours lecture, 3 hours lab weekly

Designed for candidates for elementary teaching credential; topics include problem-solving, language of sets, number systems, and numerical operations; emphasis on explanations for elementary school students.

Transfer credit: UC, CSU

**MATH R103—Finite Mathematics 3 units**

Prerequisites: MATH R014.

3 hours lecture weekly

Finite mathematics is for students of Business, Social Science, Behavioral Science, and/or for those who wish to complete a general education mathematics course to transfer to a four-year university. Topics include sets, problems in counting and probability, linear programming, game theory, and their applications in Business, Social and Behavioral Science. (2)

Transfer credit: UC, CSU (CAN: MATH 12)

**MATH R105—Introductory Statistics 4 units**

Prerequisites: MATH R014.

4 hours lecture weekly

This course covers descriptive and applied statistics for students of social sciences, education, business, life sciences, and engineering. Included are discussions of measures of central tendency and variation, probability and sets, normal curves, hypothesis testing, regression and correlation, the "t" and chi-square distributions, analysis of variance and non-parametric tests. (2)

Transfer credit: UC, CSU (CAN: STAT 2)

**MATH R105L—Statistics Computer Laboratory 1 unit**

Corequisites: MATH R105.

3 hours lab weekly

MATH R105L is an optional three-hour laboratory to be taken concurrently with MATH R105. In the course, students will be taught how to use the statistical software package called MINITAB and they will complete laboratory exercises using MINITAB. They will also learn to work in small groups to do projects and solve problems. (2)

Transfer credit: CSU

**MATH R105P—Statistics Problem Solving 1 unit**

Corequisites: Enrollment in MATH R105.

(1) = Credit/No Credit only (2) = Credit/No Credit at student's option

1 hour lecture weekly

This course is a problem-solving session to accompany MATH R105. It gives students the chance to gain a greater mastery of the topics covered in MATH R105 by providing additional discussion and problem-solving opportunities. This includes opportunities to learn from each other by working in small groups on projects and assignments. The course offers students time to do lab exercises, often using a computer to aid calculations. (2)

Transfer credit: CSU

**MATH R106—Mathematics for Business Applications 5 units**

Prerequisites: MATH R014.

5 hours lecture weekly

Short course in calculus and analytic geometry for students in business, social and life sciences; topics include functions, limits, differentiation and curve sketching, related rates, maxima and minima, integration, and differential equations. Not recommended to mathematics and physical science majors. (2)

Transfer credit: UC, CSU (CAN: MATH 30)

**MATH R115—College Algebra 3 units**

Prerequisites: MATH R014.

3 hours lecture weekly

An advanced course in algebra, this course focuses on the study of functions and their graphs, techniques of solving equations and the recognition and creation of patterns. Students will analyze and graph functions (constant, linear, quadratic, absolute value, square root, cubic, polynomial, rational, exponential, and logarithmic). Topics also include inequalities, absolute values, analytic geometry of conic sections, systems of linear and nonlinear equations and inequalities, matrices, determinants, the binomial theorem, sequences, series, and mathematical induction. This course includes problem-solving strategies with applications to many areas including business and the social, biological, and physical sciences. (2)

Transfer credit: UC, CSU

**MATH R115P—College Algebra Problem Solving 1 unit**

Prerequisites: MATH R115 or concurrent enrollment.

1 hour lecture weekly

Course is a problem-solving session to accompany MATH R115. It gives students the chance to gain a greater mastery of the topics covered in MATH R115 by providing additional discussion and problem-solving opportunities. It also gives students a richer experience in intermediate algebra by introducing supplementary topics related to the core material of MATH R115. This course may also include appropriate topics from the history of mathematics and opportunities to use a computer in solving algebra and related problems. Course may be taken two times. (2)

Transfer credit: CSU

**MATH R116—College Trigonometry 3 units**

Prerequisites: MATH R014.

3 hours lecture weekly

This course is designed to give Calculus-bound students a solid foundation in trigonometric functions. Emphasis will be placed on the trigonometric functions and their graphs, radian measure, trigonometric identities and equations, inverse trigonometric functions, complex numbers, and DeMoivre's Theorem. Special topics in trigonometry, such as solving right-triangle applications, law of sines, law of cosines, parametric equations, vectors, polar coordinates, and curves in polar coordinates are also included. (2)

Transfer credit: CSU (CAN: MATH 8)

**MATH R116P—College Trigonometry Problem Solving 1 unit**

Prerequisites: MATH R116 or concurrent enrollment.

1 hour lecture weekly

Course is a problem-solving session to accompany MATH R116. It gives students the chance to gain a greater mastery of the topics covered in MATH R116 by providing additional discussion and problem-solving opportunities. It also gives students a richer experience in intermediate algebra by introducing supplementary topics related to the core material of MATH R116. This course may also include

appropriate topics from the history of mathematics and opportunities to use a computer in solving trigonometry and related problems. Course may be taken two times. (2)

*Transfer credit: CSU*

### **MATH R118—Precalculus Mathematics** 5 units

*Prerequisites: MATH R014.*

This course gives the calculus-bound student a solid foundation in precalculus algebra and analytic trigonometry, with emphasis on function concepts and graphing. Topics include equations and inequalities, analytic geometry of lines and conic sections, properties of functions, techniques of graphing, elementary functions (linear, quadratic, rational, exponential, logarithmic, and trigonometric) and inverse functions, trigonometric identities and equations, polar graphing, optimization applications, systems of equations, theory of equations, mathematical induction, binomial theorem, sequences, and series. (2)

*Transfer credit: CSU (CAN: MATH 16)*

### **MATH R118A—Precalculus I** 4 units

*Prerequisites: MATH R014.*

*4 hours lecture weekly*

Course is designed to give calculus-bound students a solid foundation in trigonometric functions. Course also includes equations, inequalities, coordinates and graphs, operations on functions and techniques of graphing function. No credit for students having successfully completed MATH R116 (College Trigonometry). (2)

*Transfer credit: UC, CSU (CAN: MATH 16 (MATH R118A + R118B))*

### **MATH R118B—Precalculus II** 4 units

*Prerequisites: MATH R118A.*

*4 hours lecture weekly*

Course is designed to give calculus-bound students a solid foundation in college algebra and analytic geometry. Topics include polynomial, rational, exponential and logarithmic functions, systems of equations, conic sections, roots of equations, mathematical induction, the Binomial theorem, and introduction to arithmetic and geometric series. No credit for students who have successfully completed MATH R115 (College Algebra).

*Transfer credit: UC, CSU (CAN: MATH 16 (MATH R118A + R118B))*

### **MATH R118P—Pre-Calculus Mathematics Problem Solving** 1 unit

*Prerequisites: MATH R118 or concurrent enrollment in MATH R118.*

*1 hour lecture weekly*

Course is a problem-solving session to accompany MATH R118. It gives students the chance to gain a greater mastery of the topics covered in MATH R118 by providing additional discussion and problem-solving opportunities. It also gives students a richer experience in intermediate algebra by introducing supplementary topics related to the core material of MATH R118. This course may also include appropriate topics from the history of mathematics and opportunities to use a computer in solving algebra and related problems. (College credit only; does not apply toward a degree.) Course may be taken two times. (2)

*Transfer credit: CSU*

### **MATH R120—Calculus with Analytic Geometry I** 5 units

*Prerequisites: MATH R118.*

*5 hours lecture weekly*

The first course in the calculus sequence, this course combines elements of analytic geometry with calculus applications. It includes the study of functions, limits, the derivative, continuity, techniques and applications of differentiation, and an introduction to the anti-derivatives and integration. (2)

*Transfer credit: UC, CSU (CAN: MATH 18; MATH SEQ A (MATH R120 + R121; MATH SEQ C (MATH R120 + R121 + R122))*

### **MATH R120P—Calculus with Analytic Geometry I Problem Solving** 1 unit

*Prerequisites: MATH R120 or concurrent enrollment.*

*1 hour lecture weekly*

Course is a problem-solving session to accompany MATH R120. It gives students the chance to gain a greater mastery of the topics covered in MATH R120 by providing additional discussion and problem-solving opportunities. It also gives students a richer experience in

intermediate algebra by introducing supplementary topics related to the core material of MATH R120. This course may also include appropriate topics from the history of mathematics and opportunities to use a computer in solving calculus and related problems. Course may be taken three times. (2)

*Transfer credit: CSU*

### **MATH R121—Calculus with Analytic Geometry II** 5 units

*Prerequisites: MATH R120.*

*5 hours lecture weekly*

As the second course in the calculus sequence, this course emphasizes Integral Calculus, techniques of integration, and applications of definite integrals. It also includes the study of conic sections, parametric equations, and an introduction to differential equations. (2)

*Transfer credit: UC, CSU (CAN: MATH 20; MATH SEQ A (MATH R120 + R121; MATH SEQ C (MATH R120 + R121 + R122))*

### **MATH R121P—Calculus with Analytic Geometry II Problem Solving** 1 unit

*Prerequisites: MATH R121 or concurrent enrollment.*

*1 hour lecture weekly*

Course is a problem-solving session to accompany MATH R121. It gives students the chance to gain a greater mastery of the topics covered in MATH R121 by providing additional discussion and problem-solving opportunities. It also gives students a richer experience in intermediate algebra by introducing supplementary topics related to the core material of MATH R121. This course may also include appropriate topics from the history of mathematics and opportunities to use a computer in solving trigonometry and related problems. Course may be taken two times. (2)

*Transfer credit: CSU*

### **MATH R122—Calculus with Analytic Geometry III** 5 units

*Prerequisites: MATH R121.*

*5 hours lecture weekly*

As the third course in the calculus sequence, this course reviews the calculus of several variables and solid analytic geometry. It includes the study of partial derivatives, multiple integrals, infinite series, vector valued functions, line and surface integrals, Stoke's Theorem, and the Divergence Theorem. (2)

*Transfer credit: UC, CSU (CAN: MATH 22; MATH SEQ C (MATH R120 + R121 + R122))*

### **MATH R122P—Advanced Calculus Problem Solving** 1 unit

*Prerequisites: MATH R122 or MATH R125 or concurrent enrollment.*

*1 hour lecture weekly*

Course is a problem-solving session to accompany MATH R122 or MATH R125. It gives students the chance to gain a greater mastery of the topics covered in these courses by providing additional discussion and problem-solving opportunities. It also gives students a richer experience by introducing supplementary topics related to the core material of MATH R122 or MATH R125. This course may also include appropriate topics from the history of mathematics and opportunities to use a computer in solving calculus and related problems. Course may be taken three times. (2)

*Transfer credit: CSU*

### **MATH R125—Differential Equations with Linear Algebra** 5 units

*Prerequisites: MATH R121.*

*5 hours lecture weekly*

The topics in this course will include vector spaces, linear transformations and matrices, eigenvectors, determinants, canonical forms, ordinary differential equations, systems of equations, and Laplace and Fourier transformations. Field trips may be required. (2)

*Transfer credit: UC, CSU*

### **MATH R134—Linear Algebra** 3 units

*Prerequisites: MATH R120.*

*3 hours lecture weekly*

(1) = Credit/No Credit only (2) = Credit/No Credit at student's option

This is an introductory course in linear algebra for mathematics, physical science, computer science, and engineering major students who have completed a first course in calculus. The topics in this course include solutions of systems of linear equations, matrix operations, determinants, vector spaces, linear transformations, eigenvalues and eigenvectors, and orthogonal bases. This course may also include opportunities to use a computer to assist in solving problems and in graphing solutions. (2)

*Transfer credit: UC, CSU (CAN: MATH 26)*

**MATH R143—Applied Differential Equations      3 units**

*Prerequisites: MATH R121.*

*3 hours lecture weekly*

This is an introductory course in solving equations that involve rates of change. It includes the study of first order ordinary differential equations, higher order linear differential equations, systems of differential equations, Laplace transform techniques and power series solutions. This course may also include opportunities to use a computer to assist in solving problems and in graphing solutions.

*Transfer credit: UC, CSU (CAN: MATH 24)*

**MATH R198—Advanced Short Courses in  
Mathematics      ½-10 units**

*Prerequisites: Minimum of MATH R014.*

*Lecture and/or lab hours as required by unit formula*

Advanced Short Courses in Mathematics provides courses in selected areas of mathematics to meet specific needs of the college or the community when those needs are not met by regular course offerings. The length of the course will determine the unit credit. Field trips may be required. (2)

*Transfer credit: CSU*

**MATH R199—Directed Studies in Math      1-3 units**

*Prerequisites: MATH R120.*

*Lecture and/or lab hours as required by unit formula*

Designed for students interested in furthering their knowledge on an independent study basis. Course may be taken two times. (2)

*Transfer credit: CSU*

**NOTE:** The courses listed below have been temporarily suspended. For further information, please contact the Math, Science & Health division office.

- MATH 23      Geometry
- MATH R137      Computer Programming—FORTRAN
- MATH R137L      Computer Programming,  
Supervised Practice—FORTRAN
- MATH R138      Computer Programming—PASCAL
- MATH R138L      Computer Programming, Supervised  
Practice—PASCAL