

MATHEMATICS (MATH)

MATH 951 Modern Math and Applications Supplement (1)

Practice and review of mathematical topics needed to fully understand the content of MATH 1009. Corequisite: MATH 1009. Each section of MATH 951 will be linked to a specific section of MATH 1009.

Prerequisite: MM CAT 3 or CAT 4.

Requisite(s): Category QR3 or QR4 and corequisite: MATH 1009.

MATH 952 Statistics in the Modern World Supplement (1)

Practice and review of mathematical topics needed to fully understand the content of MATH 1209. Corequisite: MATH 1209. Each section of MATH 952 will be linked to a specific section of MATH 1209. Prerequisite: MM CAT 3 or CAT 4.

Requisite(s): Category QR3 or QR4, corequisite: MATH 1209.

Course Fee: Yes

MATH 953 Number Systems and Algebraic Thinking for Preservice Elementary Teachers Supplement (1)

Practice and review of mathematical topics needed to fully understand the content of MATH 2120. Corequisite: MATH 2120. Each section of MATH 953 will be linked to a specific section of MATH 2120. Prerequisite: MM CAT 3 or CAT 4.

Requisite(s): Category QR3 or QR4, corequisite MATH 2120

MATH 954 Geometry, Probability and Statistics for Preservice Elementary Teachers Supplement (1)

Practice and Review of mathematical topics needed to fully understand the content of MATH 3120. Corequisite: MATH 3120. Each section of MATH 954 will be linked to a specific section of MATH 3120. Prerequisite: MM CAT 3 or CAT 4.

Requisite(s): Prerequisite: Category QR3 or QR4, corequisite MATH 3120.

MATH 1000 Quantitative Reasoning Experiences (1)

This course is an introduction to quantitative reasoning - presented in the form of several modules. Students will work in groups on the problems presented in the modules and present their work to the class. This course is typically offered in the Summer.

Requisite(s): Early Start Program - requires student to be enrolled in an Early Start Plan.

Typically Offered: Summer

Course Fee: Yes

MATH 1009 Modern Math and Applications (3)

A survey of topics in modern mathematics. Lectures will focus on the uses of mathematics in areas such as a social choice, management science, growth, symmetry, and statistics. Students in MM CAT3 or CAT 4 need to take this class with the supplement MATH 952. This Foundational Skills course must be completed with a grade of C- or higher. Satisfies general education requirement Area B4 Quantitative Reasoning.

General Education Attribute(s): GE (B4) Quantitative Reasoning

Typically Offered: Fall, Spring

Course Fee: Yes

MATH 1010 Fundamental Concepts (4)

Foundational elements of geometry, data analysis, and algebra. This course is intended for students pursuing a major in science, engineering, technology, or business. Topics include: algebra of polynomial, rational, and radical expressions; factoring; introduction to rational exponents; systems of linear equations; absolute value, quadratic, rational, and radical equations; linear and absolute value inequalities; square and higher-order roots and introduction to rational exponents; domain, range, and algebra of functions; introduction to exponential and logarithmic functions; graphs of linear and quadratic functions; graphs of basic rational, radical, exponential, and logarithmic functions; geometric formulas and applications; introduction to statistics, counting, and probability. Emphasis is on applications of concepts. For students in MM CAT 3 or CAT 4.

Typically Offered: Fall, Spring

Course Fee: Yes

MATH 1019 Introduction to Scientific Thinking (3)

Development of critical thinking skills related to the analysis and evaluation of arguments. Topics include: analysis and criticism of deductive and inductive reasoning, justification and evidence, sentential and predicate calculus, naive set theory, and mathematical induction. Examples will focus on scientific arguments. The course involves writing complete, logically consistent arguments in English and in Mathematics to illustrate the correct use of the logical tools and methods discussed. Prerequisites: MM CAT 1 or 2. This Foundational Skills course must be completed with a grade of C- or higher. Satisfies general education requirement GE A3 Critical Thinking.

Requisite(s): Prerequisites: MM QR1 or QR2.

General Education Attribute(s): GE (A3) Critical Thinking

MATH 1020 College Algebra, Dual Credit Program (3)

This course is the first half of the Precalculus course sequence. Topics include: polynomial, rational, exponential, and logarithmic functions, the fundamental theorem of algebra, and applications. Open only to students in the dual-credit portion of the CSUB Early Enrollment Program.

MATH 1030 College Algebra and Trigonometry, Dual Credit Program (3)

This course is a combined version of College Algebra and Trigonometry. Topics include: polynomial, rational, exponential, and logarithmic functions, the fundamental theorem of algebra, trigonometric functions, analytic trigonometry, vectors, polar equations, parametric equations, conic sections, and applications. Open only to students in the dual-credit portion of the CSUB Early Enrollment Program. This Foundational Skills course must be completed with a grade of C- or higher.

MATH 1040 Precalculus I and II Combined (6)

This course is a combined version of Precalculus I and II. Topics include: polynomial, rational, exponential, and logarithmic functions, the fundamental theorem of algebra, and their applications, trigonometric functions, analytic trigonometry, vectors, polar form of complex numbers, and conic sections, and applications. Prerequisites: (1) Score of 65 or higher on the Math Placement Exam or (2) MM QR1 or QR2. This Foundational Skills course must be completed with a grade of C- or higher.

Requisite(s): Prerequisites: (1) Score of 65 or higher on the Math Placement Exam or (2) MM QR1 or QR2.

Course Fee: Yes

MATH 1050 Precalculus I (4)

This course is the first half of the Precalculus Sequence. Topics include: polynomial, rational, exponential, and logarithmic functions, the fundamental theorem of algebra, and applications. Prerequisite: Student must satisfy at least one of the following requirements (1) 550 or higher on the SAT Math exam, or (2) 23 or higher on the ACT Math exam, or (3) C- or better in MATH 930 or 1010, or (4) MM QR1 or QR2. This Foundational Skills course must be completed with a grade of C- or higher.

Requisite(s): Prerequisite: Student must satisfy at least one of the following requirements (1) 550 or higher on the SAT Math exam, or (2) 23 or higher on the ACT Math exam, or (3) C- or better in MATH 930 or 1010, or (4) MM QR1 or QR2.

Typically Offered: Fall, Spring

Course Fee: Yes

MATH 1051 Precalculus I Supplement (1)

This course, a supplement to MATH 1050, reinforces basic algebraic skills including exponents, roots, and factoring. Prerequisite or corequisite: MATH 1050.

Requisite(s): Prerequisite or Corequisite: MATH 1050.

Typically Offered: Fall, Spring

MATH 1055 Precalculus I with Foundations (6)

This course includes all of the material of Math 1050, plus selected foundational material such as algebra of polynomials, rational, and radical expressions, factoring, systems of linear equations, quadratic, rational, and radical equations, the midpoint and distance formulas, ratios, proportions, and similar triangles. Prerequisite: QR Category 3 status and permission of student's advisor or the instructor.

Requisite(s): Prerequisite: QR Category 3 status and permission of student's advisor or the instructor.

MATH 1060 Precalculus II (4)

This course is the second half of the Precalculus Sequence. Topics include: trigonometric functions, analytic trigonometry, vectors, polar equations, parametric equations, conic sections, and applications. Prerequisite: Student must satisfy at least one of the following requirements: (1) C- or better in MATH 1050 or MATH 1055; or (2) A score of 70 or higher on the Math Placement Exam. This Foundational Skills course must be completed with a grade of C- or higher.

Requisite(s): Prerequisite: Student must satisfy at least one of the following requirements: (1) C- or better in MATH 1050 or MATH 1055; or (2) A score of 70 or higher on the Math Placement Exam.

Typically Offered: Fall, Spring

Course Fee: Yes

MATH 1209 Statistics in the Modern World (3) 

This course introduces statistical applications and reasoning to a diverse audience. The aim is to provide understanding of basic statistical principles rather than in depth coverage of statistical methods so that the student can understand research reports involving statistics and its applications reported in the media. Topics include: sampling, experimentation, data exploration, chance phenomena, and basic methods of statistical inference. The course will include many examples from the Humanities and Social Sciences. Use of statistical software. Students in MM CAT 3 or CAT 4 need to take this class with the supplement MATH 952. Not open to students with credit in MATH 2200. This Foundational Skills course must be completed with a grade of C- or higher. Satisfies general education requirement Area B4 Quantitative Reasoning.

General Education Attribute(s): GE (B4) Quantitative Reasoning

Typically Offered: Fall, Spring

Course Fee: Yes

MATH 1300 Finite Mathematics (3)

Mathematics for business and social sciences. Topics selected from set theory, combinatorics, probability, statistics, systems of equations, matrix algebra, linear programming, Markov chains, graph theory, and mathematics of finance. Prerequisite: Student must satisfy at least one of the following requirements: (1) SAT (Math) score of 550 or higher, or (2) ACT (Math) score of 23 or higher,

Requisite(s): Prerequisite: Student must satisfy at least one of the following requirements: (1) SAT (Math) score of 550 or higher, or (2) ACT (Math) score of 23 or higher,

Course Fee: Yes

MATH 2010 Calculus for the Biological and Chemical Sciences I (4)

Introduction to differential calculus with emphasis on limiting behavior.

Topics include: discrete time models, sequences and difference equations with applications in the life sciences, limits, continuity, derivatives, rules for differentiation, optimization, and stability.

Trigonometry is introduced and utilized as needed throughout the course. This course makes use of technology. It is designed for the life sciences and is not intended for students in the engineering, physical or mathematical sciences. Prerequisite: student must satisfy one of the following requirements (1) A grade of C- or better in MATH 1030, MATH 1040, MATH 1050 or MATH 1055, or (2) a score of at least 70 on the MATH placement Exam, or (3) a score of 50 on the CLEP Exam. Note: this course is not a prerequisite for MATH 2320 or MATH 2520. This Foundational Skills course must be completed with a grade of C- or higher.

Requisite(s): Must satisfy one of the following (1) C- or better in MATH 1030, 1040, 1050, or 1055 or (2) a score of at least 70 on the MATH placement Exam, or (3) a score of 50 on the CLEP Exam.

Typically Offered: Fall, Spring

Course Fee: Yes

MATH 2020 Calculus for Biological & Chemical Sciences II (4)

Introduction to integral calculus, differential equations, and multivariable calculus. Topics from integral calculus include: accumulation, signed area, the Fundamental Theorem of Calculus, computational methods, use of tables, numerical approximations, antiderivatives, techniques of integration, and applications of the integral such as area, volume, mean values. Topics from differential equations include: modeling, algebraic and graphical solutions, slope fields, numerical software and analytic solutions. Topics from multivariable calculus include: graphs, partial derivatives, the chain rule, optimization. This course makes use of technology. It is designed for the life sciences and is not intended for students in engineering, physics or the mathematical sciences.

Prerequisite: C- or better in MATH 2010. Not open to students with credit in MATH 2310 or MATH 2510. This Foundational Skills course must be completed with a grade of C- or higher.

Requisite(s): Prerequisite: C- or better in MATH 2010.

Course Fee: Yes

MATH 2120 Number Systems and Algebraic Thinking for Preservice Elementary Teachers (5)

First of two courses intended to provide preservice elementary school teachers the deep understanding of K-8 mathematics that is required to be effective teachers. It includes the examination of the mathematics in the Number and Algebra strands of California's Common Core State Standards for Mathematics. It is a mathematics content course that models teaching techniques that promote exploration, discussion and conceptual understanding as described in California's Standards for Mathematical Practice and Mathematics Framework. Students are required to think beyond how to get answers and also consider the multiple ways young students may think about the concepts and make sense of the mathematics. The use of manipulatives is a major component of the course. Prerequisite: (1) SAT-M score of 550 or higher, or (2) ACT-M score of 23 or higher, or (3) a score of 3, 4, or 5 on any of the AP Statistics, AP AB or BC Calculus, exams, or (4) a score of 60 on the Math Placement Exam, or (5) C- or better in MATH 0930.

Requisite(s): Prerequisite: (1) SAT-M score of 550 or higher, or (2) ACT-M score of 23 or higher, or (3) a score of 3, 4, or 5 on any of the AP Statistics, AP AB or BC Calculus, exams, or (4) a score of 60 on the Math Placement Exam, or (5) C- or better in MATH 0930.

Typically Offered: Fall, Spring

Course Fee: Yes

MATH 2200 Introduction to Statistical Concepts and Methods (4)

This course is an introduction to statistical methods which stresses the development of critical thinking skills and increased awareness of how these methods are applied in a variety of disciplines. It is designed to give students a foundation for further study of statistics. Topics include: descriptive statistics, sampling and experimentation, confidence intervals, two-sample hypothesis tests for means, topics in categorical data analysis, and simple linear regression. Additional topics may include one way and two-way ANOVA for completely randomized designs. This course will emphasize the statistical reasoning underlying the methods and make use of the mathematical software program R. Prerequisite: (1) SAT Math score of 550 or higher, or (2) ACT (Math) score of 23 or higher, or (3) C- or better in MATH 0930 or MATH 1010, or (4) MMQR CAT 1 or 2. This Foundational Skills course must be completed with a grade of C- or higher.

Requisite(s): Prerequisite: (1) SAT (Math) score of 550 or higher, or (2) ACT (Math) score of 23 or higher, or (3) C- or better in MATH 0930 or 1010, or (4) MMQR CAT 1 or 2.

Typically Offered: Fall, Spring

Course Fee: Yes

MATH 2205 Introduction to Statistical Concepts and Methods with Foundations (6)

This course includes all of the material of MATH 2200, plus foundational material such as functions, data analysis, algebra of polynomials, rational, and radical expressions, factoring, systems of linear equations, quadratic, rational, and radical equations, graphs of linear and quadratic functions, midpoint and distance formulas, ratios, proportions.

Prerequisite: QR Category 3 status and permission of student's advisor or the instructor.

Requisite(s): Prerequisite: QR Category 3 status and permission of student's advisor or the instructor.

MATH 2222 Introduction to Mathematical Computing (4)

This course introduces students with little or no prior computer programming experience to basic principles of numerical computing in a mathematical and functions, using for loops and if-else statements, and utilizing graphing technology. Topics include the Sieve of Eratosthenes, Collatz Conjecture, magic squares, Pascal's triangle, Root finding using Intermediate Value Theorem and Newton's Method, Riemann sums, optimization, systems of equations, curve fitting, chaos, and text preparation in LATEX, with other miscellaneous topics at the discretion of the instructor. Prerequisite: C- or better in MATH 2310 or MATH 2510.

Requisite(s): Prerequisite: C- or better in MATH 2310 or MATH 2510.

Typically Offered: Spring

MATH 2310 Single Variable Calculus I for Engineers (4)

A first course in single variable calculus. Topics include: Definition and computation of limits using numerical, graphical, and algebraic approaches; Continuity and differential ability of functions; Derivative as a limit; Interpretation of the derivative as: slope of tangent line, a rate of change; Differentiation formulas: constants, power rule, product rule, quotient rule and chain rule; Derivatives of transcendental functions such as trigonometric, exponential or logarithmic; Implicit differentiation with applications, and differentiation of inverse functions; Higher-order derivatives; Graphing functions using first and second derivatives, concavity and asymptotes; Indeterminate forms and L'Hopital's Rule; Maximum and minimum values, and optimization; Mean Value Theorem; Antiderivatives and indefinite integrals; Area under a curve; Definite integral; Riemann sum; Properties of the integral; Fundamental Theorem of Calculus; Integration by substitution. Course makes use of a Computer Algebra System, (and includes problem solving with a focus on engineering applications). Prerequisite (1) C- or better in MATH 1030, MATH 1040 or MATH 1060, or (2) a score of at least 80 on the Math Placement Exam, or (3) a score of 50 on the CLEP Exam. Note: Students without recent credit in MATH 1030, MATH 1040 or MATH 1060 are advised to consult the Department of Mathematics and to take the Math Placement Exam before enrolling. This Foundational Skills course must be completed with a grade of C- or higher.

Requisite(s): Prerequisite (1) C- or better in MATH 1030, MATH 1040 or MATH 1060, or (2) A a score of at least 80 on the Math Placement Exam, or (3) a score of 50 on the CLEP Exam.

Typically Offered: Fall, Spring

Course Fee: Yes

MATH 2320 Single Variable Calculus II for Engineers (4)

A second course of single variable calculus, sequences and series. Topics include: Areas between curves; Volume of a solid of revolution; Additional techniques of integration including integration by parts and trigonometric substitution; Numerical integration such as trapezoidal and Simpson's rule; Improper integrals; Applications of integration to areas and volumes; Additional applications of integration such as work, arc length, area of a surface of revolution, moments and centers of mass; direction field and Euler's method; Separable differential equations; Exponential growth and decay; Introduction to sequences and series; Multiple tests for convergence of sequences and series; Power series, radius of convergence, interval of convergence; Differentiation and integration of power series; Taylor series expansion of functions; Parametric equations and calculus with parametric curves; Polar curves and calculus in polar coordinates. Course makes use of a Computer Algebra System, and includes problem solving with a focus on engineering applications. Prerequisite: (1) C- or better in one of MATH 2310 or MATH 2510. Note: Not open to students with credit in MATH 2010. This Foundational Skills course must be completed with a grade of C- or higher.

Requisite(s): Prerequisite: C- or better in MATH 2310 or 2510.

Typically Offered: Fall, Spring

Course Fee: Yes

MATH 2330 Multivariable and Vector Calculus for Engineers (4)

Topics include: Vectors and vector operations in two and three dimensions; Vector and parametric equations of lines and planes; Rectangular equation of a plane; Dot, cross, and triple products and projections; Differentiability and differentiation including partial derivatives, chain rule, higher-order derivatives, directional derivatives, and the gradient; Arc length and curvature, tangent, normal, and binormal vectors; Vector-valued functions and their derivatives and integrals; Finding velocity and acceleration; Real-valued functions of several variables, level curves and surfaces; Limits, continuity, and properties of limits and continuity; Local and global maxima and minima extrema, saddle points, and Lagrange multipliers; Vector fields including the gradient vector field and conservative fields; Double and triple integrals; Applications of multiple integration such as area, volume, center of mass, or moments of inertia; Change of variables theorem; Integrals in polar, cylindrical, and spherical coordinates. Line and surface integrals including parametrically defined surfaces; Integrals of real-valued functions over surfaces; Divergence and curl; Green's, Stokes, and divergence theorems. Course makes use of a Computer Algebra System, and includes problem solving with a focus on engineering applications. Prerequisite: C- or better in MATH 2320, or MATH 2520. Note: Not open to students with credit in MATH 2020.

Requisite(s): Prerequisite: C- or better in MATH 2320, or MATH 2520.

Typically Offered: Fall, Spring

MATH 2510 Single Variable Calculus I (4)

A first course in single variable calculus. Topics include: Definition and computation of limits using numerical, graphical, and algebraic approaches; Continuity and differential ability of functions; Derivative as a limit; Interpretation of the derivative as: slope of tangent line, a rate of change; Differentiation formulas: constants, power rule, product rule, quotient rule and chain rule; Derivatives of transcendental functions such as trigonometric, exponential or logarithmic; Implicit differentiation with applications, and differentiation of inverse functions; Higher-order derivatives; Graphing functions using first and second derivatives, concavity and asymptotes; Indeterminate forms and L'Hopital's Rule; Maximum and minimum values, and optimization; Mean Value Theorem; Antiderivatives and indefinite integrals; Area under a curve; Definite integral; Riemann sum; Properties of the integral; Fundamental Theorem of Calculus; Integration by substitution. Course makes use of a Computer Algebra System. Prerequisite: (1) C- or better in MATH 1030, MATH 1040 or MATH 1060, or (2) A score of at least 80 on the Math Placement Exam, or (3) a score of 50 on the CLEP Exam. Note: Students without recent credit in MATH 1030, MATH 1040 or MATH 1060 are advised to consult the Department of Mathematics and to take the Math Placement Exam before enrolling. This Foundational Skills course must be completed with a grade of C- or higher.

Requisite(s): Prerequisite (1) C- or better in MATH 1030, MATH 1040 or MATH 1060, or (2) A a score of at least 80 on the Math Placement Exam, or (3) a score of 50 on the CLEP Exam.

Typically Offered: Fall, Spring

Course Fee: Yes

MATH 2520 Single Variable Calculus II (4)

A second course of single variable calculus, sequences and series. Topics include: Areas between curves; Volume of a solid of revolution; Additional techniques of integration including integration by parts and trigonometric substitution; Numerical integration such as trapezoidal and Simpson's rule; Improper integrals; Applications of integration to areas and volumes; Additional applications of integration such as work, arc length, area of a surface of revolution, moments and centers of mass; direction field and Euler's method; Separable differential equations; Exponential growth and decay; Introduction to sequences and series; Multiple tests for convergence of sequences and series; Power series, radius of convergence, interval of convergence; Differentiation and integration of power series; Taylor series expansion of functions; Parametric equations and calculus with parametric curves; Polar curves and calculus in polar coordinates. Course makes use of a Computer Algebra System. Prerequisite: (1) C- or better in one of MATH 2310 or MATH 2510. Note: Not open to students with credit in MATH 2010. This Foundational Skills course must be completed with a grade of C- or higher.

Requisite(s): Prerequisite: C- or better in MATH 2310 or 2510.

Typically Offered: Fall, Spring

Course Fee: Yes

MATH 2531 Multivariable Calculus (4)

Topics include: Vectors and vector operations in two and three dimensions; Vector and parametric equations of lines and planes; Rectangular equation of a plane; Dot, cross, and triple products and projections; Differentiability and differentiation including partial derivatives, chain rule, higher-order derivatives, directional derivatives, and the gradient; Arc length and curvature, tangent, normal, and binormal vectors; Vector-valued functions and their derivatives and integrals; Finding velocity and acceleration; Real-valued functions of several variables, level curves and surfaces; Limits, continuity, and properties of limits and continuity; Local and global maxima and minima extrema, saddle points, and Lagrange multipliers; Vector fields including the gradient vector field and conservative fields; Double and triple integrals; Applications of multiple integration such as area, volume, center of mass, or moments of inertia; Change of variables theorem; Integrals in polar, cylindrical, and spherical coordinates. Course makes use of a Computer Algebra System. Prerequisite: C- or better in MATH 2320, or MATH 2520. Note: Not open to students with credit in MATH 2020.

Requisite(s): Prerequisite: C- or better in MATH 2320, or MATH 2520.

Typically Offered: Fall, Spring

MATH 2532 Vector Calculus (2)

Topics include: Line and surface integrals including parametrically defined surfaces; Integrals of real-valued functions over surfaces; Divergence and Curl; Green's, Stokes', and Divergence theorems. Course makes use of a Computer Algebra System. Prerequisite: C- or better in MATH 2531. Note: MATH 2533 is equivalent to MATH 2531 and MATH 2532 combined.

Requisite(s): Prerequisite: C- or better in MATH 2531.

Typically Offered: Fall, Spring

MATH 2533 Multivariable and Vector Calculus (4)

Topics include: Vectors and vector operations in two and three dimensions; Vector and parametric equations of lines and planes; Rectangular equation of a plane; Dot, cross, and triple products and projections; Differentiability and differentiation including partial derivatives, chain rule, higher-order derivatives, directional derivatives, and the gradient; Arc length and curvature, tangent, normal, and binormal vectors; Vector-valued functions and their derivatives and integrals; Finding velocity and acceleration; Realvalued functions of several variables, level curves and surfaces; Limits, continuity, and properties of limits and continuity; Local and global maxima and minima extrema, saddle points, and Lagrange multipliers; Vector fields including the gradient vector field and conservative fields; Double and triple integrals; Applications of multiple integration such as area, volume, center of mass, or moments of inertia; Change of variables theorem; Integrals in polar, cylindrical, and spherical coordinates; Line and surface integrals including parametrically defined surfaces; Integrals of real-valued functions over surfaces; Divergence and Curl; Green's, Stokes', and Divergence theorems. Course makes use of a Computer Algebra System. Prerequisite: C- or better in MATH 2320 or MATH 2520. Note: Compared with the previous 2 calculus courses, this course is accelerated. Students who prefer the pace of study they are used to from MATH 2510 and MATH 2520 and/or students who earned less than a B in Calculus II should enroll in MATH 2531 and MATH 2532. These two courses cover the same material as MATH 2533. Also note: MATH 2020 is not a sufficient prerequisite for this course.

Requisite(s): Prerequisite: C- or better in MATH 2320 or MATH 2520.

Typically Offered: Fall, Spring

Course Fee: Yes

MATH 2540 Ordinary Differential Equations (4)

Topic include: first order and linear differential equations, linear systems, Laplace transforms, numerical methods, and linear and nonlinear models with a geometrical and numerical approach to solutions and to questions of stability. Mathematical Software will be utilized. Prerequisite: (1) C- or better in MATH 2020 or MATH 2320 or MATH 2520 and (2) C- or better in MATH 2222 or CMPS 2010.

Requisite(s): Prerequisite: (1) C- or better in MATH 2020 or MATH 2320 or MATH 2520 and (2) C- or better in MATH 2222 or CMPS 2010.

Typically Offered: Fall, Spring

Course Fee: Yes

MATH 2610 Linear Algebra I (4)

Topics include: matrices and systems of linear equations, linear independence, spanning sets, dimension, invertible matrices, determinants, column space, row space, null space, bases, and change of bases, vector spaces, subspaces, eigenvalues, eigenvectors, diagonalization, inner products, and orthogonal projections. Appropriate technology will be utilized. Prerequisite: C- or better in MATH 2010, MATH 2310 or MATH 2510.

Requisite(s): Prerequisite: C- or better in MATH 2010, 2310 or 2510.

Typically Offered: Fall, Spring

MATH 2701 Tutor in PreCalc & Calculus (1)

Course reinforces topics from precalculus, calculus or mathematics for prospective elementary teachers. Students work on problems related to the mathematics class in which they are concurrently enrolled with the help of a facilitator. Corequisite: Any Precalculus, Calculus or Mathematics for Prospective Elementary Teachers course. CR/NC

Requisite(s): Corequisite: Any Precalculus, Calculus or Mathematics for Prospective Elementary Teachers course.

Repeatable for Credit: Yes, up to 5 units

Typically Offered: Fall, Spring

MATH 2770 Special Topics in Mathematics (1-4)

Topics and prerequisites to be announced. May be repeated for credit with different topics up to a maximum of 20 units.

Repeatable for Credit: Yes, up to 20 units

Typically Offered: To Be Determined

MATH 2771 Problem Solving (1)

Course reinforces topics from precalculus, calculus or mathematics courses for prospective elementary teachers. Students work on problems related to the mathematics class in which they are concurrently enrolled with the help of a facilitator. Corequisite: Any Precalculus, Calculus or Mathematics for Prospective Elementary Teachers course. CR/NC only.

Requisite(s): Corequisite: Any Precalculus, Calculus or Mathematics for Prospective Elementary Teachers course.

Typically Offered: Fall, Spring

MATH 3000 Mathematical Foundations (4)

Investigation of the fundamental tools used in writing mathematical proofs. Topics include: logic and methods of proof, naive set theory, Cartesian products, partitions, equivalence relations, functions, countability, recursion, the binomial theorem and mathematical induction. This course relies heavily on problem solving and writing complete, logically consistent arguments to illustrate the correct use of the logical tools and methods discussed. Prerequisite: C- or better in MATH 2310 or MATH 2510.

Requisite(s): Prerequisite: C- or better in MATH 2310 or 2510.

Typically Offered: Fall, Spring

Course Fee: Yes

MATH 3100 Early Field Experiences (1)

The course consists of weekly seminar discussions to focus on connections between university mathematics and the mathematics that prospective secondary mathematics teachers will be teaching and as described in California's Common Core State Standards for Mathematics, Standards for Mathematical Practice, and Mathematics Framework. Course includes 45 hours of observation in middle or high schools. Observations will include opportunities for prospective teachers to interact with middle/high school students in small group instructional settings. Prerequisite or corequisite: Any upper division Mathematics major course. CR/NC.

Requisite(s): Prerequisite or corequisite: Any upper division Mathematics major course.

Typically Offered: Spring

MATH 3120 Geometry, Probability, and Statistics for Preservice Elementary Teachers (5)

Second of two courses intended to provide preservice elementary school teachers the deep understanding of K-8 mathematics that is required to be effective teachers. It includes the examination of the mathematics in the Geometry, Probability, and Statistics strands of California's Common Core State Standards for Mathematics. It is a mathematics content course that models teaching techniques that promote exploration, discussion and conceptual understanding as described in California's Standards for Mathematical Practice and Mathematics Framework. Students are required to think beyond how to get answers and also consider the multiple ways young students may think about the concepts and make sense of the mathematics. The use of manipulatives is a major component of the course. Prerequisite: C- or better in MATH 2120. Students in MM QR3 or QR4 need MATH 0954 as corequisite.

Requisite(s): Prerequisite: C- or better in MATH 2120. Students in MM QR3 or QR4 need MATH 0954 as corequisite.

Typically Offered: Fall, Spring

Course Fee: Yes

MATH 3130 Geometry, Measurement, and Fractions for the Middle Grades (4)

Topics include: similarity, dilations, equivalent fractions, factors and multiples, proofs of the Pythagorean Theorem, rigid motions, and two-dimensional representations of solids. Use of technology and manipulative materials as they relate to the middle grades curriculum. Prerequisite: Student must satisfy at least one of the following requirements (1) C- or better in MATH 3120, or (2) post-baccalaureate standing and permission of the instructor.

Requisite(s): Prerequisite: Student must satisfy at least one of the following requirements (1) C- or better in MATH 3120, or (2) post-baccalaureate standing and permission of the instructor.

Typically Offered: To Be Determined

MATH 3140 Statistics, Data Analysis, and Mathematical Modeling for the Middle Grades (4)

Topics include: surveys and experiments, graphical representations of univariate and bivariate data, measures of central tendency and dispersion, and discrete, linear, quadratic, and exponential models for physical, biological and social phenomena. Use of technology and manipulative materials as they relate to the middle grades curriculum. Prerequisite: Student must satisfy one of the following requirements (1) C- or better in MATH 2200 and MATH 3120, or (2) post-baccalaureate standing and permission of the Instructor.

Requisite(s): Prerequisite: Student must satisfy one of the following requirements (1) C- or better in MATH 2200 and 3120, or (2) post-baccalaureate standing and permission of the Instructor.

Typically Offered: To Be Determined

MATH 3150 Focus on Algebra for the Middle Grades (4)

Topics include: patterns and formulas; verbal, tabular, graphical, and symbolic representations of numerical and functional relations; and multiple approaches to word problems. Use of technology and manipulative materials as they relate to the middle grades curriculum. Prerequisites: (1) C- or better in MATH 1040 or MATH 1060, and in MATH 3120, or (2) post-baccalaureate standing and permission of the Instructor.

Requisite(s): Prerequisites: (1) C- or better in MATH 1040 or 1060, and in MATH 3120, or (2) post-baccalaureate standing and permission of the Instructor.

Typically Offered: To Be Determined

MATH 3200 Probability Theory (4)

Topics include: basic probability theory, combinatorial methods, independence, conditional and marginal probability, probability models for random phenomena, random variables, probability distributions, distributions of functions of random variables, mathematical expectation, covariance and correlation, conditional expectation, asymptotic distributions, and sampling distributions. The course makes use of the statistical program R to evaluate and graph probability models and distribution functions, and to simulate realizations of random variables. Prerequisite: C- or better in MATH 2320 or MATH 2520. Recommended MATH 2330 or MATH 2531 or MATH 2533.

Requisite(s): Prerequisite: C- or better in MATH 2320 or 2520.

Typically Offered: Fall, Spring

Course Fee: Yes

MATH 3209 Statistical Measures of Inequality in Society (3)

This course uses statistical measures as a basis for exploring dimensions of social and environmental inequalities, and why some groups are more effective than others at addressing social and environmental problems. The course will also consider the role the field of statistics has played in the development of science and industry that has contributed to the further understanding of issues in environmental inequalities. Prerequisites: At least 45 units and must have satisfied A3 and B4 general education requirements. Satisfies general education upper division Area UDD and Theme S: Sustainability and Justice.

Requisite(s): Prerequisites: At least 45 units and completion of LD Area D.

General Education Attribute(s): Theme S: Sustainability & Just, Upper Division D

MATH 3210 Applied Statistical Computing and Multivariate Methods (4)

Introduction to common applied multivariate statistical methods that provide inferences about several variables from a population. Use of statistical software to motivate understanding of a wide variety of issues related to the management of data in today's data centric world. Essential programming concepts include: typical data processing tasks, data manipulation, looping structures, conditional execution, and data management techniques. Statistical analyses include: high-dimensional data visualization, matrix algebra notation and literacy, principal components and factor analysis, and discriminant and classification analysis. Additional topics may include clustering, LaTeX, or special topics selected by instructor. Use of R and/or SAS throughout the course. No previous programming experience required. Prerequisite: C- or better in MATH 2200.

Requisite(s): Prerequisite: C- or better in Math 2200.

Typically Offered: Spring

MATH 3300 Numerical Analysis (4)

Topics include: computer representation of numbers and round-off errors, algorithms and stability, numerical solutions to nonlinear equations in one variable, direct and iterative methods for solving linear systems of equations, interpolation and polynomial approximation, numerical differentiation and integration, and initial value problems for ordinary differential equations. A computer algebra system (CAS) and/or numerical software may be used to program numerical algorithms and identify their limitations. Each week lecture meets for 200 minutes. Prerequisites: (1) C- or better in MATH 2020, MATH 2320, or MATH 2520, and (2) C- or better in MATH 2610 or CMPS 2010. MATH 3300 is cross-listed with CMPS 3300.

Requisite(s): Prerequisites: (1) C- or better in MATH 2020, MATH 2320, or MATH 2520, and (2) C- or better in MATH 2610 or CMPS 2010.

Typically Offered: Spring

Course Fee: Yes

MATH 3310 Discrete Mathematical Modeling (4)

Introduction to mathematical modeling using graph theory. Topics include: graphs, subgraphs, paths, cycles, regular and bipartite graphs, Eulerian and Hamiltonian graphs, digraphs, matrices associated to graphs, trees, spanning trees, rooted trees, path algorithms and connectivity, vertex and edge colorings. Applications include social networks, internet search engines, chemistry, ecology, archaeology, genetics, telecommunication networks, dynamical systems, the traveling salesman problem, and others depending on the instructor. Prerequisite: C- or better in MATH 2610, and MATH 3000.

Requisite(s): Prerequisite: C- or better in MATH 2610, and MATH 3000.

Typically Offered: Spring

Course Fee: Yes

MATH 3400 Euclidean Geometry (4)

The course begins with a thorough review of high school geometry, then goes on to discuss special points associated with triangles, circles and certain associated lines, Ceva's Theorem, and compass-and-straightedge constructions. There is emphasis on providing numerical formulas like the laws of sines, cosines, and tangents, Stewart's theorem, Ptolemy's theorem and the area formula of Heron. Dynamical Geometry software is used for exploration and discovery. This course provides a survey of material needed to prepare students to teach high school geometry courses. Prerequisites: C- or better in MATH 3000.

Requisite(s): Prerequisites: C- or better in MATH 3000.

Course Fee: Yes

MATH 3500 Complex Variables (4)

Topics include: complex numbers, analytic functions, conformal mapping, integrals, Cauchy's Theorem and the calculus of residues, and power series. Prerequisite: C- or better in MATH 2330, MATH 2532 or MATH 2533.

Requisite(s): Prerequisite: C- or better in MATH 2330, 2532 or 2533.

Course Fee: Yes

MATH 3520 Analysis I (4)

Introduction to Real Analysis. Topics include: cardinality, sequences and series, limits, and continuous functions. Additional topics may include: differentiation and the Riemann Integral. Prerequisites: (1) C- or better in MATH 2320 or MATH 2520, and (2) C- or better in MATH 3000.

Requisite(s): Prerequisites: (1) C- or better in MATH 2320 or MATH 2520, and (2) C- or better in MATH 3000.

Typically Offered: Fall, Spring

Course Fee: Yes

MATH 3600 Modern Algebra (4)

A study of the classical algebraic structures in mathematics. Number theory topics include: divisibility theory, induction and well ordering, Euclidean Algorithm, linear Diophantine equations, continued fractions, Euclid's Lemma and unique prime factorization of positive integers, modular arithmetic, and theorems of Euler and Fermat. Abstract Algebra topics include: groups (Z_n , U_n , Cyclic and Dihedral Groups, Frieze Groups, isometries of the plane, homomorphisms, subgroups, and quotient groups), rings (Z , Z_m , $Q[x]$, and matrices), domains (integral and Euclidean), fields (Q , R , C , and Z_p), ordered fields, subfields of C , and solutions of polynomials over R and C . Prerequisites: C- or better in both MATH 2610 and MATH 3000.

Requisite(s): Prerequisite: C- or better in MATH 2610, and MATH 3000.

Course Fee: Yes

MATH 3620 Abstract Algebra I (4)

Introduction to binary operations and basic axiomatic algebraic structures. Topics include: groups, rings, integral domains, and fields. Prerequisites: C- or better in MATH 2610 and MATH 3000.

Requisite(s): Prerequisite: C- or better in MATH 2610, and MATH 3000.

Course Fee: Yes

MATH 4110 Introduction to the History of Mathematics (4)

A survey of the history of mathematics from antiquity to the present. Topics include: modes of computation, the development of the idea of proof, the "analytical method" of algebra, and the invention of the calculus. Prerequisites: (1) C- or better in at least three upper division mathematics major courses one of which must be MATH 3000, and (2) Satisfaction of the CSU Graduation Writing Assessment Requirement (GWAR).

Requisite(s): Prerequisites: (1) C- or better in at least three upper division mathematics major courses one of which must be MATH 3000, and (2) Satisfaction of the CSU Graduation Writing Assessment Requirement (GWAR).

Typically Offered: Spring

Course Fee: Yes

MATH 4120 Modern Mathematics for Teachers (4)

The goal of the course is to cultivate a deeper understanding of grades 6 - 12 mathematics. It is a mathematics content course that models teaching techniques that promote exploration, discussion and conceptual understanding through the use of computer-based technology and manipulatives that may include, but not be limited to, fraction bars, algebra tiles and Cuisenaire rods. Students will make presentations on mathematics appropriate in California's middle school and high school classrooms and that emphasize active learning and sense-making consistent with California's Common Core State Standards, Standards for Mathematical Practice, and Mathematics Framework. Prerequisite: C- or better in at least four upper division mathematics major courses from the Teaching Concentration, including MATH 3000.

Requisite(s): Prerequisite: C- or better in at least four upper division mathematics major courses from the Teaching Concentration, including MATH 3000.

Typically Offered: Spring

MATH 4200 Mathematical Statistics (4)

This course provides an introduction to the fundamentals of statistical inference using advanced mathematical concepts and techniques for a deeper understanding of topics in estimation, confidence intervals, hypothesis testing, and basic Bayesian methods. Topics and activities include distribution of sample statistics; t, chi-squared and F distributions; estimation theory that covers sufficiency, efficiency, consistency, method of moments, maximum likelihood; hypothesis and Bayesian testing; likelihood ratio test; confidence and credible intervals; prior and posterior distributions; inference using large data sets with R; simulation aspects of topics in inference with R. Other topics may include linear models and analysis of categorical data. Prerequisite: C- or better in MATH 3200.

Requisite(s): Prerequisite: C- or higher in MATH 3200.

Course Fee: Yes

MATH 4210 Regression Modeling and Analysis (4)

Advanced course in applied regression analysis. Students develop a sense of the applicability of regression as a tool for analysis of data. Topics include: linear regression, randomization tests for linear regression, correlation analysis, model diagnostics and remedial measures, matrix algebra notation and literacy for developing concepts of linear regression, variable and model selection techniques. Additional topics may include Poisson regression, logistic regression, path analysis, forecasting, and special topics selected by instructor. Statistics software R or SAS is used throughout the course. Prerequisites: C- or better in MATH 2200 or MATH 4200. Recommended: MATH 3210.

Requisite(s): Prerequisite: C- or higher in MATH 2200 or 4200

Typically Offered: Spring

Course Fee: Yes

MATH 4220 Design and Analysis of Experiments (4)

Statistical principles and concepts in the design and analysis of experiments. Topics include: fixed and random effects models, expected mean squares, multiple comparisons, nonparametric methods, basic designs including completely randomized design, randomized blocks design, incomplete block designs, Latin squares, factorial designs, and nested designs. Use of R or SAS throughout the course. Prerequisite: C- or better in MATH 2200 or MATH 4200. Recommended: MATH 3210.

Requisite(s): Prerequisite: C- or higher in MATH 2200 or 4200

Typically Offered: Spring

Course Fee: Yes

MATH 4300 Applied Cryptography (4)

An introduction to cryptography, history and its present-day use. Topics include: symmetric ciphers, hash functions, public-key encryption, data integrity, digital signatures, key establishment, key management, prime generation, integer factorization, discrete logarithms, pseudo-random number generation, and computational complexity. Each week lecture meets for 200 minutes. Prerequisites: (1) C- or better in MATH 2020, MATH 2320, or MATH 2520, and (2) C- or better in MATH 3000 or CMPS 2120. Cross-listed as CMPS 4300 or MATH 4300.

Requisite(s): Prerequisites: (1) C- or better in MATH 2020, 2320, or 2520, and (2) C- or better in MATH 3000 or CMPS 2120.

MATH 4500 Partial Differential Equations (4)

Topics include: first order linear partial differential equations (PDEs), the method of characteristics, Cauchy Problems, Fourier Series, boundary value problems of second order PDEs from mathematical physics, orthogonal functions and generalized Fourier series, Sturm-Liouville problems, and numerical solutions. Additional topics may include: harmonic functions, Green functions, Fourier transforms, or calculus of variations. Prerequisite: C- or better in MATH 2330, MATH 2531 or MATH 2533 and MATH 2540.

Requisite(s): Prerequisite: C- or better in MATH 2330, 2531 or 2533 and 2540.

Typically Offered: Spring Odd Year

Course Fee: Yes

MATH 4520 Analysis II (4)

A continuation of Analysis I. Topics may include: the topology of the real line, Lebesgue measure, nonmeasurable sets, Lebesgue measurable functions, Lebesgue integration, uniform integrability, and a rigorous foundation of sequences and series of functions, normed linear spaces, and Hilbert space. Prerequisites: C- or better in MATH 3520.

Requisite(s): Prerequisites: C- or better in MATH 3520.

Typically Offered: Spring Odd Year

Course Fee: Yes

MATH 4600 Number Theory (4)

Elementary theory of the natural numbers. Topics include: prime numbers and divisibility, congruences, number theoretic functions, Diophantine equations, and selected topics. Prerequisites: C- or better in MATH 3000

Requisite(s): Prerequisites: C- or better in MATH 3000

Typically Offered: Fall Odd Year

Course Fee: Yes

MATH 4610 Linear Algebra II (4)

Continuation of Linear Algebra I. Topics selected from: vector spaces, subspaces, bases, dimension, linear transformations, rank, nullspace, determinants, eigenvalues and eigenvectors, diagonalization, inner product spaces, Gram-Schmidt process, adjoints, normal and self-adjoint operators, unitary and orthogonal operators, the Spectral Theorem, bilinear and quadratic forms, Jordan and rational canonical forms.

Prerequisites: (1) C- or better in MATH 2020, MATH 2320, or MATH 2520, and (2) C- or better in MATH 2610 and MATH 3000.

Requisite(s): Prerequisites: (1) C- or better in MATH 2020, 2320, or 2520, and (2) C- or better in MATH 2610 and 3000.

Typically Offered: Spring

Course Fee: Yes

MATH 4620 Abstract Algebra II (4)

Continuation of Abstract Algebra I. Topics include: Sylow Theorems, Galois Theory, and selected topics. Prerequisites: C- or better in MATH 3620

Requisite(s): Prerequisites: C- or better in MATH 3620

Typically Offered: Spring Even Year

Course Fee: Yes

MATH 4770 Special Topics in Mathematics (1-4)

Topics and prerequisites to be announced. This course can be used in the Mathematics Major only to satisfy elective requirements. Permission of instructor required. May be repeated for credit with different topics up to a maximum of 4 units.

Repeatable for Credit: Yes, up to 4 units

MATH 4800 Research Participation (1-4)

Supervised mathematical investigation. Offered on a credit, no credit basis only. Prerequisite: Permission of instructor. May be repeated for credit up to a maximum of 4 units.

Repeatable for Credit: Yes, up to 4 units

Typically Offered: To Be Determined

MATH 4850 Senior Honors Thesis (4)

Individual study with a faculty advisor leading to a formal written report on a specific topic or problem. Prerequisites: (1) Senior standing, (2) consent of faculty advisor, and (3) approval of the Chair of the Department of Mathematics.

Requisite(s): Prerequisites: (1) Senior standing, (2) consent of faculty advisor, and (3) approval of the Chair of the Department of Mathematics.

Typically Offered: To Be Determined

MATH 4860 Internship in Mathematics (1-4)

Internships may be arranged by the department with various agencies, businesses, or industries. The assignments and coordination of work projects with conferences and readings, as well as course credits, evaluation, and grading, are the responsibility of the faculty liaison, or course instructor, working with the field supervisor. Open only to matriculated students eligible to work on campus as tutors under the supervision of the Department of Mathematics. Class does not count towards the mathematics major. Not open to post-graduate mathematics students. Offered on a credit, no-credit basis only. Prerequisite: 2.0 GPA minimum. May be repeated up to a maximum of 20 units.

Requisite(s): Prerequisite: 2.0 GPA minimum

Repeatable for Credit: Yes, up to 20 units

Typically Offered: To Be Determined

MATH 4908 Senior Seminar (4)

Students in this capstone course will make presentations on, write papers about, and discover and discuss solutions of mathematical problems from varied areas of mathematics. Prerequisites: (1) Senior Status; and (2) Completion of JYDR; and (3) C- or better in at least four upper division courses from the Applied, Pure, or Statistics Concentrations; and (4) Satisfaction of the CSUB Graduation Writing Assessment Requirement (GWAR). Satisfies general education requirement Senior Capstone. May be repeated for credit.

Requisite(s): Prerequisites: (1) Senior Status; and (2) Completion of JYDR; and (3) C- or better in at least four upper division courses from the Applied, Pure, or Statistics Concentrations; and (4) Satisfaction of GWAR.

Repeatable for Credit: Yes, up to 20 units

General Education Attribute(s): Capstone

Typically Offered: Spring

MATH 4918 Senior Seminar in Mathematics for Prospective**Teachers (4)**

Students in this capstone course will make presentations on, write papers about, and discuss solutions of mathematical problems grounded in secondary school mathematics education. The focus is mathematics as described in California's Common Core State Standards, Standards for Mathematical Practice, and Mathematics Framework with appropriate inclusion of pedagogical ideas. Prerequisites: (1) Senior Status; and (2) Completion of JYDR; and (3) C- or better in at least four upper division courses from the Teaching Concentration; and (4) Satisfaction of the CSUB Graduation Writing Assessment Requirement (GWAR). Satisfies General Education requirement Senior Capstone.

Requisite(s): Prerequisites: (1) Senior Status; and (2) Completion of JYDR; and (3) C- or better in at least four upper division courses from the Teaching Concentration; and (4) Satisfaction of GWAR.

General Education Attribute(s): Capstone

Typically Offered: Spring

MATH 5210 Applied Statistical Computing and Multivariate Methods (4)

This course introduces graduate students to common applied multivariate statistical methods and the use of statistical software to motivate understanding of a wide variety of issues related to the management of data. Emphasis may be placed on applications to areas relevant to the graduate students' field of study. Prerequisites: Graduate standing and MATH 2200 or equivalent.

Requisite(s): Prerequisites: Graduate standing and MATH 2200 or equivalent.

MATH 5770 Special Topics in Mathematics (1-5)

Topics and prerequisites to be announced. Prerequisite: Permission of instructor.

Typically Offered: Moratorium

MATH 5800 Research Participation (1-5)

Supervised mathematical investigation. May be repeated. Offered on a credit, no credit basis only. Prerequisite: Permission of instructor.

Typically Offered: Moratorium

MATH 6110 Discrete and Continuous Mathem (5)

Construction and analysis of difference models from physical, biological, social, and financial sciences. Cobweb analysis, convergence, stability and chaos in discrete dynamical systems. Phase plane analysis of systems of difference equations. Use of numerical and algebraic techniques to study change. The use of forward, back, and symmetric differences in data analysis. Divided differences as average rates of change and as approximations to instantaneous rate of change. Numerical and graphical solutions to differential equations. Riemann sums to approximate accumulated change. Prerequisite: Post-baccalaureate Standing & Math 2510 Calculus I (4 units lecture and 1 unit activity).

Requisite(s): Must have obtained graduate standing to take this class.

Typically Offered: Moratorium

MATH 6120 Data Analysis and Applied Stat (5)

Classical and non-parametric confidence intervals and hypothesis tests for means, proportions, linear and multiple regression, and analysis of variance. Techniques include graphical displays, transformations, outlier identification, smoothing, regression and robustness; use of statistical package. Prerequisite: Post-baccalaureate Standing & Math 1209 Statistics in the Modern World or Math 2200 Introduction to Statistical Concepts and Methods (4 units lecture and 1 unit activity).

Requisite(s): Must have obtained graduate standing to take this class.

Typically Offered: Moratorium

MATH 6130 Intro to Math Educ Research (4)

Brief introduction to basic philosophies, key terms and generally accepted strategies of both quantitative and qualitative research, such as the criteria and procedures appropriate for establishing validity reliability, credibility, and trustworthiness. Understanding ethics, confidentiality, protection of human subjects, variables, sampling, and data collection. Major emphasis on being able to find, evaluate, and use research in math education. (3 units lecture and 1 unit activity)

Requisite(s): Must have obtained graduate standing to take this class.

Typically Offered: Moratorium

MATH 6140 Geometric Linear Algebra (4)

Algebra and geometry of vectors in two and three dimensions. Complex numbers. Matrices as linear transformations of R^2 and R^3 . Rigid motions in two and three dimensions, their classification and matrix representations: Theory and classification of conic sections. Theory of perspective. Prerequisite: Post-baccalaureate Standing & Math 3000 Mathematical Foundations. (3 units lecture and 1 unit activity)

Requisite(s): Prereqs: Math 3000 or 300 and graduate standing

Typically Offered: Moratorium

MATH 6150 History of Mathematics (4)

A survey of the history of mathematics from antiquity to the present. Topics include: modes of computation, the development of the idea of proof, the "analytical method" of algebra, and the invention of the calculus. [Taught with Math 4110 Introduction to the History of Mathematics] Prerequisite: Post-baccalaureate Standing & Math 3000 Mathematical Foundations (3 units lecture and 1 unit activity).

Requisite(s): Prereqs: Math 3000 or 300 and graduate standing

Typically Offered: Moratorium

MATH 6160 Dynamical Euclidean Geometry (3)

Investigations in the Euclidean geometry of two dimensions using dynamical software. Emphasis on exploration, conjecture and verification. Prerequisite: Post-baccalaureate Standing & Math 3000 Mathematical Foundations (1 unit lecture and 2 unit activity).

Requisite(s): Prereqs: Math 3000 or 300 and graduate standing

Typically Offered: Moratorium

MATH 6170 Culminatig Project (5)

Design and implementation of a written report of mathematical, field research, or similar activity. Prerequisite: Successful completion of 4 required courses towards the Master of Arts in Mathematics for Teachers.

Typically Offered: Moratorium