

MATHEMATICS

Mathematics is the abstract deductive study of structure and pattern that serves as the foundation of science and technology. Transfer courses in mathematics emphasize the development of mathematical and quantitative reasoning skills beyond the level of intermediate algebra. Courses satisfy general education requirements for the Associate Degree for Transfer in Mathematics, and lower division transfer.

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Learning Outcomes

This discipline prepares students to do the following:

- Use proper vocabulary and notation when describing mathematical concepts; be able to read books and documents and extract quantitative information.
- Develop level-appropriate computational skills: numeric calculation, evaluation of expressions, analysis of data and application of concepts.
- Develop an understanding of, and curiosity toward the physical world.
- Develop the analytic skills to devise questions and propose quantitative solutions.
- Demonstrate computational skills and an understanding of mathematical reasoning that will increase self-esteem and set them on a path of lifelong learning.
- Be adept at using instructional software found by navigating the Web and the Windows environment.
- Perform mathematics functions at a level appropriate to the course. This "level" may range from arithmetic through differential equations and may include statistics, teacher prep and other topics.

Courses

MATH 040

Pre-Statistics

5 Units

90 lecture hours

Grade Mode: Pass/No Pass, Standard Letter

This course surveys a variety of mathematical topics needed to prepare students for college-level statistics. Pre-Statistics is designed for students in majors such as those in liberal arts, humanities, and social sciences. It should not be taken by students majoring in science, technology, engineering, math, business, nursing, or any other major requiring a specific math course other than statistics. Topics include: performing operations on and evaluation of algebraic expressions, designing observational studies and experiments, graphical and tabular display of data, summarizing data, computing probabilities, describing associations of two variables graphically, graphing equations of lines and linear models, solving linear equations and inequalities, and finding linear models.

MATH 065

Corequisite Support For Introductory Statistics

2 Units

36 lecture hours

Grade Mode: Pass/No Pass

Prerequisite(s): Direct placement based on multiple measures.

Co-Requisite(s): Concurrent enrollment in MATH 165 at Citrus College.

A review of the core prerequisite skills, competencies, and concepts needed in statistics. Intended for students who are concurrently enrolled in Math 165, Introductory Statistics, at Citrus College. Topics include concepts from arithmetic, pre-algebra, elementary and intermediate algebra, and descriptive statistics that are needed to understand the basics of college-level statistics. Concepts are taught through the context of descriptive data analysis. Additional emphasis is placed on solving and graphing linear equations and modeling with linear functions. Pass/No Pass only. Non-degree applicable.

MATH 075**Corequisite Support for Pre-Calculus****2 Units****36 lecture hours****Grade Mode: Pass/No Pass***Prerequisite(s): Direct placement based on multiple measures.**Co-Requisite(s): MATH 175.*

A review of the core prerequisite skills, competencies, and concepts needed in pre-calculus. Intended for majors in science, technology, engineering, and mathematics (STEM) who are concurrently enrolled in MATH 175, Pre-Calculus, at Citrus College. Topics include: a review of computational skills developed in intermediate algebra, factoring, operations on rational and radical expressions, absolute value equations and inequalities, exponential and logarithmic expressions and equations, conic sections, functions including composition and inverses, an in-depth focus on quadratic functions, and a review of topics from geometry. This course is appropriate for students who are confident in their graphing and beginning algebra skills. A graphing calculator is required for this course.

MATH 080**Corequisite Support for Calculus for Business and Social Sciences****2 Units****36 lecture hours****Equivalent to: MATH 062****Grade Mode: Pass/No Pass***Prerequisite(s): Direct placement based on multiple measures.**Co-Requisite(s): MATH 180.*

This course is designed for those students who are concurrently enrolled in MATH 180 at Citrus College. The course will help students review their problem solving skills for linear and piecewise-defined functions and nonlinear equations and functions such as quadratic, rational, radical, exponential and logarithmic. Other review topics include: solving and graphing linear, piecewise-defined, quadratic, exponential and logarithmic functions, solving and graphing inequalities in one and two variables, solving and graphing linear systems of equations in two variables, factoring polynomials and complex rational expressions and algebraic operations on simplifying complex rational expressions. A scientific calculator is required for this course. Non-degree applicable.

MATH 090**Corequisite Support for Calculus I****2 Units****36 lecture hours****Grade Mode: Pass/No Pass***Prerequisite(s): Direct placement based on multiple measures.**Co-Requisite(s): MATH 190.*

Support for this course focuses on the prerequisite skills, competencies, and concepts needed for success in a Calculus with Analytic Geometry I course. This course is intended for majors in science, technology, engineering, and mathematics (STEM) who are concurrently enrolled in MATH 190, Calculus with Analytic Geometry I, at Citrus College. Students will receive extra support in topics such as algebra, analytic geometry, trigonometry, technology, and study skills. A graphing calculator is required for this course. Pass/No Pass only. Non-degree applicable.

MATH 144**Technical Mathematics****5 Units (AA/AS; Citrus A3; CSU; CSUGE B4)****90 lecture hours****Grade Mode: Pass/No Pass, Standard Letter***Prerequisite(s): Elementary algebra or higher or direct placement based on multiple measures.*

Reviews and extends concepts from elementary algebra and geometry, and introduces new content from trigonometry, statistics, and other mathematical topics that can be applied to problems that arise in a career and technical setting. Simplifying algebraic expressions, functions, basic graphing, systems of linear equations, linear and quadratic equations, triangles, circles, quadrilaterals, polygons, prisms, spheres, cylinders, statistical graphs, measures of central tendency, measures of variation, normal distribution, right-angle trigonometry, radian measure, Law of Sines, Law of Cosines, sine and cosine graphs, binary and hexadecimal numbers, measurement, metric system, signed numbers and powers of ten. Emphasis is on technical applications and problem-solving skills including the appropriate use of technology.

MATH 150**Intermediate Algebra****5 Units (AA/AS; Citrus A3)****90 lecture hours****Grade Mode: Pass/No Pass, Standard Letter***Prerequisite(s): Elementary algebra or higher or direct placement based on multiple measures.*

Real number properties, first degree equations and inequalities, absolute value equations and inequalities, formulas, applications, exponents, polynomials, the binomial theorem, factoring, linear systems, functions, rational expressions, radicals, complex numbers, quadratic equations, conics, inverse functions, and exponential and logarithmic functions.

MATH 151**Plane Trigonometry****4 Units (AA/AS; Citrus A3; CSU; CSUGE B4)****72 lecture hours****Grade Mode: Pass/No Pass, Standard Letter***Prerequisite(s): MATH 150 or higher or direct placement based on multiple measures.*

The study of trigonometric functions, their inverses and their graphs, identities and proofs related to trigonometric expressions, trigonometric equations, solving right triangles, solving triangles using the Law of Cosines and the Law of Sines, polar coordinates, and introduction to vectors.

MATH 160**Mathematics for Everyday Living - A Liberal Arts Course****5 Units (AA/AS; Citrus A3; CSU; IGETC 2A; UC; CSUGE B4)****90 lecture hours****Grade Mode: Pass/No Pass, Standard Letter***Prerequisite(s): MATH 150 or higher or direct placement based on multiple measures.*

A course in mathematical concepts for the liberal arts student. Topics include critical thinking, approaches to problem solving, numbers in the real world, financial management, statistical reasoning, probability, and applications of exponential growth and decay.

MATH 165**Introductory Statistics****4 Units (AA/AS; Citrus A3; CSU; IGETC 2A; UC; CSUGE B4)****72 lecture hours****Grade Mode: Standard Letter***Prerequisite(s): MATH 040 or MATH 150 or direct placement based on multiple measures.*

Introductory course to statistics and probability, descriptive analysis, and presentation of data, hypothesis testing, statistical inference, normal curve, chi square, and applications in diverse disciplines.

MATH 165H**Introductory Statistics - Honors****4 Units (AA/AS; Citrus A3; CSU; IGETC 2A; UC; CSUGE B4)****72 lecture hours****Grade Mode: Standard Letter***Prerequisite(s): MATH 040 or MATH 150 or higher or direct placement based on multiple measures; ENGL 101 or ENGL 101E or ENGL 101H or higher or direct placement based on multiple measures; also, student must be eligible for the Citrus College Honors Program or obtain a recommendation from an Honors instructor.*

Introductory course to statistics and probability, descriptive analysis, and presentation of data, hypothesis testing, statistical inference, normal curve, chi-square, and applications in diverse disciplines. Students are expected to work and participate at an honors level which includes strong critical thinking skills, thorough analysis of mathematical readings, presentation, and leadership skills demonstrated through class participation/presentation and service learning in the community.

MATH 168**Mathematics for Elementary Teachers I****5 Units (AA/AS; Citrus A3; CSU; UC; CSUGE B4)****90 lecture hours****Grade Mode: Standard Letter***Prerequisite(s): MATH 150 or higher, or direct placement based on multiple measures.*

Course is designed for prospective elementary teachers. The course covers problem solving, logic and sets, number systems and operations, number theory and algebraic reasoning. Techniques in instructional delivery explored.

MATH 169**Mathematics for Elementary Teachers II****5 Units (AA/AS; CSU; UC; CSUGE B4)****90 lecture hours****Grade Mode: Standard Letter***Prerequisite(s): MATH 168.*

Second class for elementary school teachers. Course covers topics in measurement, geometry, probability and statistics. Techniques in the design of instruction delivery will be explored.

MATH 170**College Algebra****4 Units (AA/AS; Citrus A3; CSU; IGETC 2A; UC; CSUGE B4)****72 lecture hours****Grade Mode: Standard Letter***Prerequisite(s): MATH 150 or direct placement based on multiple measures.*

College level course in algebra for majors in the liberal arts. Polynomial, rational, radical, exponential, absolute value, and logarithmic functions; systems of equations; theory of polynomial equations; analytic geometry.

MATH 175**Pre-Calculus****6 Units (AA/AS; Citrus A3; CSU; IGETC 2A; UC; CSUGE B4)****108 lecture hours****Grade Mode: Standard Letter***Prerequisite(s): MATH 150 or MATH 151 or direct placement based on multiple measures.*

Preparation for calculus; polynomial, rational, exponential, logarithmic, and trigonometric functions; analytic geometry; systems of equations; sequences and series; mathematical induction.

MATH 180**Calculus for Business and Social Sciences****4 Units (AA/AS; Citrus A3; CSU; IGETC 2A; UC; CSUGE B4)****72 lecture hours****Equivalent to: MATH 162****Grade Mode: Pass/No Pass, Standard Letter***Prerequisite(s): MATH 150 or higher or direct placement based on multiple measures.*

Concepts of function and limits: applied calculus emphasizing techniques of integration and differentiation with applications in social and life sciences, business administration, economics, and engineering technology.

MATH 190**Calculus with Analytic Geometry I****5 Units (AA/AS; Citrus A3; CSU; IGETC 2A; UC; CSUGE B4)****90 lecture hours****Grade Mode: Pass/No Pass, Standard Letter***Prerequisite(s): MATH 175 or direct placement based on multiple measures.*

A first course in differential and integral calculus of a single variable: functions; limits and continuity; techniques and applications of differentiation and integration; Fundamental Theorem of Calculus. Primarily for science, technology, engineering & math majors.

MATH 191**Calculus with Analytic Geometry II****5 Units (AA/AS; Citrus A3; CSU; IGETC 2A; UC; CSUGE B4)****90 lecture hours****Grade Mode: Pass/No Pass, Standard Letter***Prerequisite(s): MATH 190.*

A second course in differential and integral calculus of a single variable: integration; techniques of integration; infinite sequences and series; polar and parametric equations; applications of integration. Primarily for science, technology, engineering & math majors.

MATH 210**Calculus with Analytic Geometry III****5 Units (AA/AS; Citrus A3; CSU; IGETC 2A; UC; CSUGE B4)****90 lecture hours****Grade Mode: Pass/No Pass, Standard Letter***Prerequisite(s): MATH 191.*

Vectors, calculus of functions of more than one variable, partial derivatives, multiple integration, vector calculus, Green's Theorem, Stokes' Theorem, and divergence theorem.

MATH 211**Differential Equations****5 Units (AA/AS; Citrus A3; CSU; IGETC 2A; UC; CSUGE B4)****90 lecture hours****Grade Mode: Pass/No Pass, Standard Letter***Prerequisite(s): MATH 210.*

Solve first and higher order (linear and non-linear) differential equations with applications. Existence and uniqueness of the solution for constant or variable coefficient homogeneous and nonhomogeneous differential equations of first and higher order. Use linear algebra techniques to solve systems of linear differential equations and their applications. Solve initial valued problems of 2nd and higher order differential equations using the method of Laplace Transforms. Approximate the solution to variable coefficient (nonCauchy-Euler) differential equations using power series.

MATH 212**Introduction to Linear Algebra****4 Units (AA/AS; Citrus A3; CSU; IGETC 2A; UC; CSUGE B4)****72 lecture hours****Grade Mode: Standard Letter***Prerequisite(s): MATH 191.*

This course develops the techniques and theory needed to solve and classify systems of linear equations. Solution techniques include row operations, Gaussian elimination, and matrix algebra. The course investigates the properties of vectors in two and three dimensions, leading to the notion of an abstract vector space. Vector space and matrix theory are presented including topics such as inner products, norms, orthogonality, eigenvalues, eigenspaces, and linear transformations. Selected applications of linear algebra are included. This introduction to linear algebra course complements coursework in calculus.

Course Sequence

Effective fall 2019, the mathematics course sequence has been revised into a career pathway version and a traditional version, with additional support classes built in to promote success in MATH 165 Introductory Statistics, MATH 175 Pre-Calculus, MATH 180 Calculus for Business and Social Sciences, and MATH 190 Calculus with Analytic Geometry I.

See Placement Procedures (<https://www.citruscollege.edu/placement/Pages/default.aspx>) for the full pathways.

Programs

Associate Degree

- ADT in Mathematics (<http://catalog.citruscollege.edu/disciplines/mathematics/mathematics-adt/>)