

# MATHEMATICS (MTH)

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For information about Southwestern's math placement process or math pathways please talk to an advisor in the Student Success Center at 541-888-7405.

It is highly important that students consult with their advisor to make sure they are following the appropriate mathematics path needed for their chosen degree.

## **MTH105A Corequisite Support for MTH 105** 1 credit (2 lec lab hrs/wk)

Prerequisite(s): Instructor consent

This support course focuses on the foundational skills and concepts needed to be persistent and successful in MTH 105. Students will receive appropriate support as needed in arithmetic, algebra, problem solving, geometry, technology, and study skills in an interactive setting.

This course may be taken 1 time for credit.

Course classification: LDC

## **MTH105Z Math in Society** 4 credits

Prerequisite(s): (MTH95) or (MTH98)

An exploration of present-day applications of mathematics focused on developing numeracy. Major topics include quantitative reasoning and problem-solving strategies, probability and statistics, and financial mathematics; these topics are to be weighted approximately equally. This course emphasizes mathematical literacy and communication, relevant everyday applications, and the appropriate use of current technology.

This course may be taken 1 time for credit.

Course classification: LDC

## **MTH111A Corequisite Support for MTH111** 1 credit (2 lec lab hrs/wk)

Prerequisite(s): Instructor consent

This support course focuses on the foundational skills, concepts and communication needed to be persistent and successful in MTH 111. Students will receive appropriate support as needed in algebra, functions, problem solving, graphing, technology, and study skills in an interactive setting.

This course may be taken 1 time for credit.

Course classification: LDC

## **MTH111Z Precalculus I: Functions** 4 credits

Prerequisite(s): (MTH95)

A course primarily designed for students preparing for trigonometry or calculus. This course focuses on functions and their properties, including polynomial, rational, exponential, logarithmic, piecewise-defined, and inverse functions. These topics will be explored symbolically, numerically, and graphically in real-life applications and interpreted in context. This course emphasizes skill building, problem solving, modeling, reasoning, communication, connections with other disciplines, and the appropriate use of present-day technology.

This course may be taken 1 time for credit.

Course classification: LDC

## **MTH112Z Precalculus II: Trigonometry** 4 credits (4 lec hrs/wk)

Prerequisite(s): (MTH111Z)

A course primarily designed for students preparing for calculus and related disciplines. This course explores trigonometric functions and their applications as well as the language and measurement of angles, triangles, circles, and vectors. These topics will be explored symbolically, numerically, and graphically in real-life applications and interpreted in context. This course emphasizes skill building, problem solving, modeling, reasoning, communication, connections with other disciplines, and the appropriate use of present-day technology.

This course may be taken 1 time for credit.

Course classification: LDC

## **MTH180 Internship: Mathematics** 1-12 credits (3 lab hrs/wk/cr)

Prerequisite(s): Instructor consent

Practical on-site experience that will allow students to explore workplace environments and career options.

This course may be taken 12 times for credit.

Course classification: LDC

## **MTH20 Basic Mathematics** 4 credits (4 lec hrs/wk)

A course designed to (1) introduce students to various applications of basic mathematics and (2) prepare students for elementary algebra by strengthening their foundations in the real number system. Topics include: Whole numbers and their operations; signed numbers and their operations; fraction and decimal notation; ration and proportion; percent notation; geometry; and, an introduction to variables and linear equations.

This course may be taken 1 time for credit.

Course classification: DEV

## **MTH211 Fundamentals of Elementary Mathematics I** 4 credits (4 lec hrs/wk)

Prerequisite(s): (MTH95)

A foundation in mathematics for elementary teachers. Topics include: Introduction to problem solving, number systems, number theory, logic, sets, relations, and functions.

This course may be taken 1 time for credit.

Course classification: LDC

## **MTH212 Fundamentals of Elementary Mathematics II** 4 credits (4 lec hrs/wk)

Prerequisite(s): (MTH211)

A foundation in mathematics for elementary teachers. Topics include: Rational numbers, exponents, decimals and applications. Probability and statistics will be introduced.

This course may be taken 1 time for credit.

Course classification: LDC

## **MTH213 Fundamentals of Elementary Mathematics III** 4 credits (4 lec hrs/wk)

Prerequisite(s): (MTH212)

A foundation in mathematics for elementary teachers. Topics include: Euclidean geometry, constructive geometry, measurement, motion and tessellation.

This course may be taken 1 time for credit.

Course classification: LDC

**MTH231 Elements of Discrete Mathematics I** 4 credits (4 lec hrs/wk)

Prerequisite(s): ( MTH112Z )

Topics include: Propositional calculus (the logic of compound statements), predicate calculus (the logic of quantified statements), elementary number theory and proof methods, sequences and mathematical induction, set theory. The first course of a two-term sequence strongly recommended for computer engineering, computer science and mathematics majors.

This course may be taken 1 time for credit.

Course classification: LDC

**MTH232 Elements of Discrete Mathematics II** 4 credits (4 lec hrs/wk)

Prerequisite(s): ( MTH231 )

Topics include: Functions, recursion, graphs of functions, coordinate diagrams, order notation, efficiency of algorithms, relations, partially and totally ordered sets, (topological) graph and tree theory. The second course of a two-term sequence strongly recommended for computer engineering, computer science and mathematics majors.

This course may be taken 1 time for credit.

Course classification: LDC

**MTH241 Calculus for Bus and Soc Science I** 4 credits (4 lec hrs/wk)

Prerequisite(s): ( MTH111Z )

Review of functions and their graphs. Overview of limits and continuity. Introduction to differential calculus of polynomial and rational functions. Cover rules and techniques of differentiation. Introduction to First and Second Derivative Tests, curve sketching, and optimization. Applications in economics, business, social and managerial sciences.

This course may be taken 1 time for credit.

Course classification: LDC

**MTH242 Calculus for Bus and Soc Science II** 4 credits (4 lec hrs/wk)

Prerequisite(s): ( MTH241 )

Introduction to exponential and logarithmic functions and their derivatives. Uses of exponential and natural logarithmic functions. Introduction to integral calculus of polynomial, rational, exponential, and logarithmic functions. Cover Riemann sums, Fundamental Theorem of Calculus, and techniques of integration. Applications in the social and manager sciences.

This course may be taken 1 time for credit.

Course classification: LDC

**MTH243A Corequisite Support for MTH243** 1 credit (2 lec lab hrs/wk)

Prerequisite(s): Instructor consent

This support course focuses on the foundational skills, concepts and communication needed to be persistent and successful in MTH 243. In an interactive setting, students will receive appropriate support in quantitative and reasoning skills, reading comprehension, statistic notations, problem solving, technology, and study skills.

This course may be taken 1 time for credit.

Course classification: LDC

**MTH244 Probability & Statistics II** 4 credits (4 lec hrs/wk)

Prerequisite(s): ( STAT243Z )

Offers a second course open to all majors covering testing of two-sample problems, linear regression and correlation, chi-squared tests, one-way and two-way analysis of variance, and non-parametric methods.

This course may be taken 1 time for credit.

Course classification: LDC

**MTH251 Calculus I Differential Calculus** 4 credits (3 lec, 2 lec lab hrs/wk)

Prerequisite(s): ( MTH112Z )

Topics include: pre-calculus concepts and principles; limits and their properties, continuous functions; indeterminate forms and l'Hôpital's rule; derivatives and their properties; the chain rule, implicit differentiation; relative extrema, the first and second derivative tests; applications involving rectilinear motion of a particle and optimization of functions.

This course covers the standard differential calculus topics required for engineering, mathematics, and science majors.

This course may be taken 1 time for credit.

Course classification: LDC

**MTH252 Calculus II Integral Calculus** 4 credits (3 lec, 2 lec lab hrs/wk)

Prerequisite(s): ( MTH251 )

Topics include: antiderivatives, Riemann sums, integrals and their properties; the first and second fundamental theorems of calculus; calculation of length, area, volume, work, and resultant force via integration; integrals of exponential, logarithmic, hyperbolic, trigonometric and inverse trigonometric functions; integration by substitutions, tables, and by parts. This course covers the standard integral calculus topics required for engineering, mathematics, and science majors.

This course may be taken 1 time for credit.

Course classification: LDC

**MTH253 Calculus III Infinite Sequences And Series** 4 credits (3 lec, 2 lec lab hrs/wk)

Prerequisite(s): ( MTH252 )

Topics include: improper integrals; differential equations; infinite sequences and series; convergence tests for infinite series; Taylor series for functions; translated and rotated conic sections; polar and parametric equations; calculus in polar and parametric. This course covers the standard sequences and series topics required for engineering, mathematics, and science majors.

This course may be taken 1 time for credit.

Course classification: LDC

**MTH254 Vector Calculus I** 4 credits (3 lec, 2 lec lab hrs/wk)

Prerequisite(s): ( MTH252 )

Topics include three-dimensional space and coordinate systems, analytic geometry, vector algebra, space curves, surfaces, vector-valued functions, vector calculus, parametrizations, curvature, functions of several variables, and derivatives of functions of several variables.

This course may be taken 1 time for credit.

Course classification: LDC

**MTH255 Vector Calculus II** 4 credits (3 lec, 2 lec lab hrs/wk)

Prerequisite(s): ( MTH254 )

Topics include tangent planes and gradient; optimization of functions of several variables; iterated integration, multiple integrals; divergence and curl of vector fields, line and surface integrals; Green's, Gauss', and Stokes' theorems.

This course may be taken 1 time for credit.

Course classification: LDC

**MTH256 Differential Equations** 4 credits (3 lec, 2 lec lab hrs/wk)

Prerequisite(s): ( MTH252 )

Topics include first-order linear and nonlinear ODEs; second-order linear ODEs; series solutions to second-order linear ODEs; Laplace transforms; systems of linear ODEs.

This course may be taken 1 time for credit.

Course classification: LDC

**MTH260 Matrix Methods and Linear Algebra** 4 credits (4 lec hrs/wk)

Prerequisite(s): ( MTH252 )

Topics include: Matrix concepts and algebra; determinants and inverses of matrices; solution methods for systems of linear equations; linear independence linear transformations and vector spaces; bases and coordinates; eigenvalues and eigenvectors; diagonalization of matrices.

This course covers the standard linear algebra topics required for engineering, mathematics, and science majors.

This course may be taken 1 time for credit.

Course classification: LDC

**MTH264 Introduction to Matrix Algebra and Power Series** 4 credits (4 lec hrs/wk)

Prerequisite(s): ( MTH252 )

Topics include: Introduction to matrix algebra; systematic solution to systems of linear equations; linear transformations; eigenvalue problems. This course covers the standard matrix algebra topics required for engineering, mathematics, and science majors. Convergence and divergence of numerical series, including geometric series. Series of functions. Power series and their analytic properties. Taylor series expansions and Taylor polynomials.

This course may be taken 1 time for credit.

Course classification: LDC

**MTH280 CWE: Math** 1-12 credits (3 lab hrs/wk/cr)

Prerequisite(s): Instructor consent

Practical worksite exposure to applied science, which provides students an opportunity to explore potential career paths in science while gaining practical experience in applying classroom science theory.

This course may be taken 12 times for credit.

Course classification: LDC

**MTH60 Algebra I** 4 credits (4 lec hrs/wk)

Prerequisite(s): ( MTH20 )

A study of the concepts and principles considered in algebra. Topics include: Signed numbers; algebraic expressions; linear equations and inequalities; polynomial expressions, operations, and factorizations; quadratic equations.

This course may be taken 1 time for credit.

Course classification: DEV

**MTH65 Algebra II** 4 credits (4 lec hrs/wk)

Prerequisite(s): ( MTH60 )

A study of the concepts and principles considered in algebra. Topics include: Graphing linear equations and functions; factoring; solving polynomial equations; rational expressions, equations, and functions; and systems of linear equations and matrices.

This course may be taken 1 time for credit.

Course classification: DEV

**MTH80 Technical Mathematics I** 4 credits (4 lec hrs/wk)

Prerequisite(s): ( MTH20 ) or ( MTH55 )

This course includes basic algebraic concepts and their application in technical scenarios involving measurement precision and accuracy, materials consumption, labor and production estimates, product design, dimensioning and tolerances, economical layout, takeoffs and estimates, and metal bending and stretchouts. Offered by the mathematics department in cooperation with the career technical education faculty.

This course may be taken 1 time for credit.

Course classification: DEV

**MTH81 Applied Mathematics for Culinary Arts** 4 credits (4 lec hrs/wk)

Prerequisite(s): ( MTH20 ) or ( MTH55 ), or instructor consent

Includes basic algebraic concepts with culinary applications, basic statistics and graphing, graphing in a rectangular coordinate system, and weights, measures and metric conversion. Offered by the mathematics department in cooperation with the culinary education faculty. Enrollment in the culinary program required as a co-requisite for this course.

This course may be taken 1 time for credit.

Course classification: DEV

**MTH82 Business Mathematics** 4 credits (4 lec hrs/wk)

Prerequisite(s): ( MTH20 )

This course includes basic algebraic concepts and their application in business scenarios involving discounts, pricing and inventory control, payrolls and banking, simple and compound interest, billing, accounting, taxes, and depreciation. Offered by the mathematics department in cooperation with the business faculty.

This course may be taken 1 time for credit.

Course classification: DEV

**MTH95 Intermediate Algebra** 4 credits (4 lec hrs/wk)

Prerequisite(s): ( MTH65 )

A study of the concepts and principles considered in intermediate algebra. Topics include: Radical expressions and equations, complex numbers, quadratic equations, quadratic functions and their graphs, conic sections; absolute value equations and inequalities; absolute value functions and their graphs.

This course may be taken 1 time for credit.

Course classification: DEV

**MTH98 Math Literacy** 4 credits (4 lec hrs/wk)

Prerequisite(s): ( MTH20 )

Math Literacy is a course designed for liberal arts and humanities majors. This course develops quantitative reasoning, modeling, and problem solving skills needed in MTH105 and in other college courses in programs not requiring calculus. For students not needing calculus, MTH98 is an alternative to MTH 60/65/95 as a pathway to MTH105. Topics include rational numbers and their representations, linear relationships, proportional reasoning, statistics, and probability.

This course may be taken 1 time for credit.

Course classification: DEV