

# MATHEMATICS (MAT)

## **MAT 105 Intro to Algebra (3 Credits)**

This course introduces and develops the basic concepts and skills needed for college algebra and beyond. The course contains topics that include, but are not limited to: numbers and their properties, exponents, ratios, proportion, equations and inequalities, problem solving, graphs, and polynomials. Offered as needed.

**Department:** Preparatory Studies

**Pre-Requisites:** None

**Co-Requisites:** None

**Fees:** None

## **MAT 112 Mathematics for the Sciences (3 Credits)**

This course includes study of the algebra of functions, rational functions, solving and graphing non-linear functions, inequalities and the complex number system, including applications to applied problems such as dose calculations and other topics of relevance to the life sciences and veterinary/medical fields. Additional topics such as matrices, sequences and series, or conic sections may be covered at the discretion of the instructor. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 105.

**Co-Requisites:** None

**Restrictions:** Enrollment is limited to Undergraduate level students.

**Fees:** None

## **MAT 113E Introductory Algebra (4 Credits)**

This course reviews the structure of algebra, including numbers and their properties, exponents, equations and inequalities, polynomials, functions and graphs. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** None

**Co-Requisites:** None

**Fees:** 65

## **MAT 113X Introductory Algebra (4 Credits)**

This course reviews the structure of algebra, including numbers and their properties, exponents, equations and inequalities, polynomials, functions and graphs.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** None

**Co-Requisites:** None

**Fees:** 60

## **MAT 114 Intermediate Algebra (3 Credits)**

Intermediate Algebra assumes proficiency with the techniques of basic algebra. The course includes study of the algebra of functions, rational functions, solving and graphing non-linear functions, inequalities, and the complex number system. Additional topics such as matrices, sequences and series, or conic sections may be covered at the discretion of the instructor. Offered as needed.

**Essential Learning Outcomes for Medaille College:** Quantitative Reasoning

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 105.

**Co-Requisites:** None

**Restrictions:** Enrollment is limited to Undergraduate level students.

**Fees:** None

## **MAT 115 Pre-Calculus (3 Credits)**

This course combines pertinent topics from intermediate algebra and trigonometry that are necessary as fundamentals to master subsequent course study in calculus. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 112 or 114.

**Co-Requisites:** None

**Restrictions:** Enrollment is limited to Undergraduate level students.

**Fees:** None

## **MAT 116X Math for Veterinary Technology (4 Credits)**

This course emphasizes the mathematical concepts and skills used in the practice of Veterinary Technology. Topics include dosage calculations, fractions, percentages and percent solutions, utilizing metric system, dimensional analysis, scientific notation, unit conversions, equations, graphs, and logarithms as they apply to the health sciences. Emphasis will be placed on how these techniques are used in the administration of medications and treatments for patient use. Offered as needed.

**Essential Learning Outcomes for Medaille College:** Quantitative Reasoning

**Department:** Science, Mathematics Technol

**Pre-Requisites:** None

**Co-Requisites:** None

**Fees:** None

## **MAT 117E Math for Applied Sciences (4 Credits)**

This course emphasizes the mathematical concepts and skills used in the science fields. Topics covered include fractions, percentage, the metric system, dimensional analysis, scientific notation, unit conversions, equations, graphs, and logarithms. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** None

**Co-Requisites:** None

**Fees:** None

## **MAT 121E Mathematical Applications (4 Credits)**

This course is an introduction to the basic mathematical concepts, techniques, and applications associated with the fields of business and management. Topics include the algebra of linear equations, graphing, compound interest, set theory, and mathematical reasoning. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** None

**Co-Requisites:** None

**Fees:** None

## **MAT 121X Mathematical Applications (4 Credits)**

This course is an introduction to the basic mathematical concepts, techniques, and applications associated with the fields of business and management. Topics include the algebra of linear equations, graphing, compound interest, set theory, and mathematical reasoning. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** None

**Co-Requisites:** None

**Fees:** None

**MAT 125 Concepts in Mathematics I (3 Credits)**

This is a course in a two-semester sequence designed for Elementary Education majors and students seeking a broader understanding of the field of mathematics. Topics covered in this course include problem solving, numeration systems, arithmetic operations, fractions, and elementary number theory. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 105.

**Co-Requisites:** None

**Restrictions:** Enrollment is limited to Undergraduate level students.

**Fees:** None

**MAT 125E Concepts in Mathematics I (3 Credits)**

This is a course in a two-semester sequence designed for Elementary Education majors and students seeking a broader understanding of the field of mathematics. Topics covered in this course include problem solving, numeration systems, arithmetic operations, fractions, and elementary number theory. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 113E.

**Co-Requisites:** None

**Fees:** None

**MAT 126 Concepts in Mathematics II (3 Credits)**

This is a course in a two-semester sequence designed for Elementary Education majors and students seeking a broader understanding of the field of mathematics. Topics covered in this course include decimals, ratio and proportional relationships, integers, real numbers, probability, measurement, dimensional analysis, and data analysis. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 125.

**Co-Requisites:** None

**Fees:** None

**MAT 126E Concepts in Math II (3 Credits)**

This is a course in a two-semester sequence designed for Elementary Education majors and students seeking a broader understanding of the field of mathematics. Topics covered in this course include decimals, ratio and proportional relationships, integers, real numbers, probability, measurement, dimensional analysis, and data analysis. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 125E.

**Co-Requisites:** None

**Fees:** None

**MAT 151 College Geometry and Trigonometry (3 Credits)**

This course is an introductory study of the structures of Geometry and Trigonometry. Topics covered will include Trigonometric Functions, Complex Numbers, Constructions, Symbolic logics and Proofs, Synthetic and Metric Axioms, Circles, and Analytic Geometry. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 112 or 114.

**Co-Requisites:** None

**Fees:** None

**MAT 152 College Geometry (3 Credits)**

This course is an introductory study of the structures of geometry. It is designed for Elementary Education majors and students seeking a broader understanding of the area of geometry. Topics covered in this course include two- and three-dimensional geometric shapes, perimeter, area, volume, congruence and similarity, coordinate geometry, and transformations. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 112 or 114.

**Co-Requisites:** None

**Fees:** None

**MAT 182 Discrete Mathematics (3 Credits)**

This course is an introduction to non-continuous mathematics. Topics will include Logic, Proof, Matrices, Linear Programming, Counting, and Functions. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 115.

**Co-Requisites:** None

**Restrictions:** Enrollment is limited to Undergraduate level students.

**Fees:** None

**MAT 199 Math Elective (3 Credits)**

**Department:** None

**Pre-Requisites:** None

**Co-Requisites:** None

**Fees:** None

**MAT 201 Statistics and Society (3 Credits)**

An introduction to data collection and interpretation, measurement, variability, survey and experiment design, statistical summarization, and statistical inference. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 112 or 114.

**Co-Requisites:** None

**Restrictions:** Enrollment is limited to Undergraduate level students.

**Fees:** None

**MAT 203E Statistics For Today's Businesses (4 Credits)**

This course presents an introduction to data collection and interpretation, descriptive and inferential statistics, sampling, hypothesis testing, and probability distribution as they apply to business planning and decision-making. Emphasis is placed on the use of statistical software for data analyses and the ethical uses of statistics. \*Note: Successful completion of this course requires a minimum grade of C for students in the Health Information Management (HIM) program. For the HIM program, a Pass/Fail grade cannot be taken for this course. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 113E.

**Co-Requisites:** None

**Fees:** None

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#### **MAT 203X Stats. for Today's Businesses (4 Credits)**

This course presents an introduction to data collection and interpretation, descriptive and inferential statistics, sampling, hypothesis testing, and probability distribution as they apply to business planning and decision-making. Emphasis is placed on the use of statistical software for data analyses and the ethical uses of statistics. \*\*Note: Successful completion of this course requires a minimum grade of C for students in the Health Information Management (HIM) program. For the HIM program, a Pass/Fail grade cannot be taken for this course. Prerequisites and/or Special Considerations: completion of MAT 105 or higher placement. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 113X.

**Co-Requisites:** None

**Fees:** None

#### **MAT 205E Math For Information Systems (4 Credits)**

This course provides a survey of college mathematics with emphasis placed on the nature of mathematics, problem solving, and thinking patterns. Topics covered will be selected from the areas of algebra, geometry, systems of numeration and unit analysis. Mathematical topics integral to computing are also covered, including Boolean logic and algorithmic analysis. Students will apply concepts to individual and group problem solving. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** None

**Co-Requisites:** None

**Fees:** None

#### **MAT 205X Math For Information Systems (4 Credits)**

This course provides a survey of college mathematics with emphasis placed on the nature of mathematics, problem solving, and thinking patterns. Topics covered will be selected from the areas of algebra, geometry, systems of numeration and unit analysis. Mathematical topics integral to computing are also covered, including Boolean logic and algorithmic analysis. Students will apply concepts to individual and group problem solving. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** None

**Co-Requisites:** None

**Fees:** None

#### **MAT 216 Survey Of Introductory Calculus And Its Applications (3 Credits)**

This course introduces the techniques of differential and integral calculus and illustrates these ideas with practical applications from the social, managerial, and life sciences with special emphasis on business and economics. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 115.

**Co-Requisites:** None

**Restrictions:** Enrollment is limited to Undergraduate level students.

**Fees:** None

#### **MAT 250 Operations Analysis & Modeling (3 Credits)**

This course is an introduction to the modeling of certain operational features common to business and information systems management. The focus will be on scheduling models, allocation models, queuing models, and inventory models. The models will provide mathematical information, which can be used in the decision-making processes needed to solve large-scale problems. Emphasis is on problem formulation and experimentation with "naive" methods of solution; microcomputer software will be used to solve problems representative of the real world. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** (MAT 112 or 114) and (CIS 115 or 120).

**Co-Requisites:** None

**Restrictions:** Enrollment is limited to Undergraduate level students.

**Fees:** None

#### **MAT 251 Calculus I (3 Credits)**

Calculus I is the first course of a three semester sequence in Calculus, covering differentiation with applications, including transcendental functions.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 115.

**Co-Requisites:** MAT 251L

**Fees:** None

#### **MAT 251L Calculus I Lab (0 Credit)**

This course is an introduction to non-continuous mathematics. Topics will include Logic, Proof, Matrices, Linear Programming, Counting, and Functions.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 115.

**Co-Requisites:** None

**Fees:** None

#### **MAT 252 Calculus II (3 Credits)**

Calculus II is the second of a three course sequence in Calculus. The course covers integration, including transcendental functions, methods of integration, sequences and series with applications. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 251 or 216.

**Co-Requisites:** MAT 252L

**Restrictions:** Enrollment is limited to Undergraduate level students.

**Fees:** None

#### **MAT 252L Calculus II Lab (0 Credit)**

Calculus II is the second of a three course sequence in Calculus. The course covers integration, including transcendental functions, methods of integration, sequences and series with applications. Three hours of lecture and one hour of lab/recitation per week. \*\*Note: Registration for both the lecture MAT 252 and the lab MAT 252L is required. \*\*Note: Successful completion of this course requires a minimum grade of C for students in the Adolescent Teaching: Mathematics 7-12 & Students with Disabilities program. For the Adolescent Teaching-Mathematics 7-12 & Students with Disabilities program, a Pass/Fail grade cannot be taken for this course.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 251 or 216.

**Co-Requisites:** MAT 252

**Restrictions:** Enrollment is limited to Undergraduate level students.

**Fees:** None

**MAT 255 Theory of Numbers (3 Credits)**

This course is an introduction to the theory of numbers. Topics will include Prime Numbers, Divisibility, Congruencies, and Powers of an Integer Modulo  $m$ , Quadratic Reciprocity, Greater Integer Function, and Diophantine Functions. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 151 and 182.

**Co-Requisites:** None

**Restrictions:** Enrollment is limited to Undergraduate level students.

**Fees:** None

**MAT 260 Linear Algebra (3 Credits)**

This course is an introduction to Linear Algebra. The topics covered will include Systems of Linear Equations, Vectors and Vector Spaces, Linear Transformations, Linear Dependence, Matrices, Determinants, Basis and Dimensions, Eigenvectors and Invariant Spaces. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 251.

**Co-Requisites:** None

**Restrictions:** Enrollment is limited to Undergraduate level students.

**Fees:** None

**MAT 261 Calculus III (3 Credits)**

Calculus III extends the concepts of calculus in one variable to the calculus of several variables. Course topics include: vectors in the plane and space; 3-dimensional coordinate system; vector-valued functions; differential geometry; partial differentiation; and multivariable calculus. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 252.

**Co-Requisites:** None

**Fees:** None

**MAT 261L Calculus III Lab (0 Credit)**

**Department:** Science, Mathematics Technol

**Pre-Requisites:** None

**Co-Requisites:** None

**Fees:** None

**MAT 265 Financial Mathematics (3 Credits)**

A financial mathematics course including topics such as time value and money, annuities/cash flows with non-contingent payments, loans, bonds, general cash flows and portfolios, immunization, interest rate swaps, and determinants of interest rates. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 115.

**Co-Requisites:** None

**Fees:** None

**MAT 281 Statistics and Probability I (3 Credits)**

This course introduces students to descriptive statistics, elementary probability theory and counting techniques, random variables, probability distributions, normal distributions, confidence intervals and hypothesis testing. The topics of the course will be presented at a level of depth that is appropriate to mathematics majors. Students will also learn to apply technology to problem solving in statistics. \*\*Note: Successful completion of this course requires a minimum grade of C for students in the Adolescent Teaching: Mathematics 7-12 & Students with Disabilities program. For the Adolescent Teaching-Mathematics 7-12 & Students with Disabilities program, a Pass/Fail grade cannot be taken for this course. \*\*Note: Registration for both lecture MAT 281 and lab MAT 281L is required. Prerequisite: MAT 115

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 115.

**Co-Requisites:** MAT 281L

**Fees:** None

**MAT 298 Special Topic in Mathematics (3 Credits)**

Topic to be specified each semester course offered.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** None

**Co-Requisites:** None

**Restrictions:** Enrollment is limited to Undergraduate level students.

**Fees:** None

**MAT 342 Abstract Algebra (3 Credits)**

The main goal of this course is to expose the student to the abstract concepts of algebra. The topics include sets, relations, mappings, groups, rings, isomorphism, homomorphism, polynomial ring, ideal, vector spaces, and linear independence. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 260\* and 255\*.

\* May be taken concurrently.

**Co-Requisites:** None

**Fees:** None

**MAT 361 Differential Equations (3 Credits)**

A first course in ordinary differential equations from analytic, geometric, numeric, and applied perspectives (including the use of modern computational technology as appropriate). Topics include exact, separable, and linear equations; initial-value and boundary-value problems; system of first-order equations; undetermined coefficients; variation of parameters; and series solutions. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 261.

**Co-Requisites:** MAT 361L

**Restrictions:** Enrollment is limited to Undergraduate level students.

**Fees:** None

**MAT 361L Differential Equations Lab (0 Credit)**

**Department:** Science, Mathematics Technol

**Pre-Requisites:** None

**Co-Requisites:** None

**Fees:** None

**MAT 381L Statistics & Probability I Lab (0 Credit)**

**Department:** Science, Mathematics Technol

**Pre-Requisites:** None

**Co-Requisites:** None

**Fees:** None

**MAT 382 Statistics and Probability II (3 Credits)**

This course focuses on the process of statistical inference, presenting confidence intervals and hypothesis testing for two populations, chi-square procedures, linear and nonlinear regression, and one-way analysis of variance. The topics of the course will be presented at a level of depth that is appropriate to mathematics majors. Students will also apply technology to problem solving in statistics. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 281 or 201.

**Co-Requisites:** MAT 382L

**Restrictions:** Enrollment is limited to Undergraduate level students.

**Fees:** None

**MAT 382L Stats. & Probability II Lab (0 Credit)**

**Department:** Science, Mathematics Technol

**Pre-Requisites:** None

**Co-Requisites:** None

**Restrictions:** Enrollment is limited to Undergraduate level students.

**Fees:** None

**MAT 385 Probability for Actuarial Science (3 Credits)**

A probability course with applications in actuarial science including topics such as general probability, random variables with univariate and multivariate probability distributions. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 261.

**Co-Requisites:** None

**Fees:** None

**MAT 398 Special Topic in Mathematics (3 Credits)**

Topic to be specified each semester course offered.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** None

**Co-Requisites:** None

**Restrictions:** Enrollment is limited to Undergraduate level students.

**Fees:** None

**MAT 421 Real Variables (3 Credits)**

This course will present the formal concepts of calculus. The topics include real numbers, one variable functions, continuity, derivatives, and Riemann integral and infinite series. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 255 and 261.

**Co-Requisites:** None

**Fees:** None

**MAT 442 Complex Analysis (3 Credits)**

This course will expose the students to the useful concepts of complex numbers, complex functions and their applications. The topic includes complex number, complex plane, analytic functions, their derivatives, Cauchy integral theorem, Cauchy-Riemann differential equations, power series, and residues. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 342 and 421.

**Co-Requisites:** None

**Fees:** None

**MAT 445 Introduction to Probability (3 Credits)**

This course is an introduction to probability theory, including probability axioms and rules, random variables, probability distribution functions, expected value, variance, moment generating functions, condition probabilities, and sampling distributions.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 261.

**Co-Requisites:** None

**Fees:** None

**MAT 450 Topology (3 Credits)**

This course will introduce the ideas of continuity, convergence, connectedness in a topological space, metric space, knot, manifold, and surface. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 255 and 261.

**Co-Requisites:** None

**Fees:** None

**MAT 455 Regression Analysis (3 Credits)**

This course is an introduction to linear regression analysis, including simple linear regression model, least-squares estimations of the parameters, multiple linear regression, simultaneous inferences and other topics in regression. A statistical software will be used for applications. Offered as needed.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** MAT 260 and 445.

**Co-Requisites:** None

**Fees:** None

**MAT 498 Independent Study/Mathematics (3 Credits)**

Topic to be specified each semester course offered.

**Department:** Science, Mathematics Technol

**Pre-Requisites:** None

**Co-Requisites:** None

**Restrictions:** Enrollment is limited to Undergraduate level students.

**Fees:** None