Mathematics (MAT)

MAT 051 Pre-Algebra

4 Hours

Prerequisites: None

4 hours weekly (4-0)

MAT 051 is designed as a review of the basic operations of arithmetic and an introduction to algebra. The student must earn a grade of "C" or higher in order to enroll in MAT 052. In addition, the student will need to enroll in MAT 052, MAT 061, and MAT 062 before progressing to transfer-level mathematics courses. This course will cover the integers, fractions and decimals; ratio, proportion and percent; prime numbers, factoring; exponents; and solving equations.

This is a developmental course which is used to calculate GPA at John A. Logan College, but does not transfer.

MAT 052 Basic Algebra

4 Hours

Prerequisites: MAT 051 or equivalent with a grade of "C" or higher or assessment

4 hours weekly (4-0)

MAT 052 is designed for students with less than one year of high school algebra. The student must earn a "C" or higher in order to enroll in MAT 062. In addition, the student will need to successfully complete MAT 061 (or equivalent) and MAT 062 before progressing to transfer-level mathematics courses. This course covers the properties of real numbers; solving equations and inequalities in one variable; operations with polynomials in one variable as well as an introduction to polynomials in several variables; factoring polynomials leading to solving quadratic equations by factoring; operations with rational expressions and solving rational equations; graphing linear equations in two variables, slope, and writing equations of lines; solving systems of linear equations; and radical notation, including solving radical equations.

This is a developmental course which is used to calculate GPA at John A. Logan College, but does not transfer.

MAT 056 Mathematical Literacy

5 Hours

Prerequisite: MAT 051 or Placement
Minimum Grade: C

5 hours weekly (5-0)

MAT 056 is designed for students with less than one year of high school algebra who need to take Introduction to Contemporary Mathematics or Elementary Statistics. This course integrates elements of basic algebra and problem solving skills. The focus will be on developing conceptual understanding and cultivating problem solving competence at the Intermediate Algebra level. While algebraic procedures will not be emphasized, some procedural skills will be necessary. Along with basic algebra skills, the course will include problem solving skills, critical thinking, and data analysis. For students who need College Algebra or Pre-Calculus, MAT 061 and MAT 062 will also be required.

MAT 061 Basic Euclidean Geometry

3 Hours

Prerequisites: MAT 052 with a grade of "C" or higher or assessment

3 hours weekly (3-0)

MAT 061 is designed for students who did not successfully complete at least one year of Euclidean geometry at the secondary level and therefore must fill this deficiency prior to

completing the mathematics requirement for their degree from John A. Logan College. In order to help students think deductively, this course will emphasize logical reasoning, using geometric concepts and relationships as the vehicle to meet this goal. Topics include reasoning, basic logic theory, definitions, axioms, proofs, constructions, line and angle relationships, parallel lines, triangle congruency, and similarity theorems, quadrilaterals, circles, and area of polygons and circles. The ultimate purpose of this course is to help students learn to apply the principles of geometry, as well as enable them to develop logical and deductive thinking.

This is a developmental course which is used to calculate GPA at John A. Logan College, but does not transfer.

MAT 062 Intermediate Algebra

5 Hours

Prerequisites: MAT 052 or MAT 056 with a grade of "C" or higher or assessment

5 hours weekly (5-0)

MAT 062 is designed for students with less than two years of high school algebra. Students must earn a grade of "C" or higher in order to progress to transfer-level mathematics courses. This course will cover linear equations and inequalities; graphs of equations—both linear and nonlinear equations; functions and graphs; slope and equation of lines; systems of equations; operations with and factoring of polynomials; operations with rational expressions and solving rational equations; operations with radical expressions and solving radical equations; rational exponents; complex numbers; quadratic equations and graphs; exponential and logarithmic functions.

This is a developmental course which is used to calculate GPA at John A. Logan College, but does not transfer.

MAT 100 Mathematics for Applied Technologies

3 Hours

Prerequisites: None

3 hours weekly (3-0)

This is a basic mathematics course for the vocational-technical student. It is not designed for college transfer. This course reviews and improves the practical and mathematical skills necessary for everyday calculations in a wide variety of trade, technical and other occupational areas, including automotive, electrical, construction, plumbing, HVAC and many more. This course begins with very basic mathematics and progresses through a minimal introduction to geometry and triangle trigonometry while stressing a wide variety of real problems and situations to improve on-the-job mathematical skills.

MAT 104 Mathematics for Allied Health

3 Hours

Prerequisites: None

3 hours weekly (3-0)

This course is designed to prepare prospective Allied Health students in the areas of mathematics in which they must be proficient in order to accurately perform their duties as licensed Health Care professionals. Topics covered include the four basic arithmetic operations as applied to positive integers, fractions, mixed numbers, and decimals as well as metric measurements. Conversions among fractions, decimals, percents, ratios, and mixed numbers are also included. The majority of the course is devoted to real problems from pharmacology.

MAT 108 College Algebra

4 Hours

Prerequisites: MAT 061 and MAT 062 both with a grade of "C" or higher or assessment

4 hours weekly (4-0)

MAT 108 is a general education mathematics course; however, it cannot be taken as the only mathematics course for the A. A. degree. College Algebra gives in-depth study of graphs of equations, functions, transformations, and polynomial and rational functions. Exponential and logarithmic functions, systems of equations and inequalities, matrices, and determinants are also covered. College Algebra requires a thorough understanding of Intermediate Algebra.

MAT 109 College Trigonometry

3 Hours

Prerequisites: MAT 108 with a grade of "C" or higher or assessment

3 hours weekly (3-0)

MAT 109 in conjunction with MAT 108 will fulfill the prerequisites for MAT 131, Calculus I. This course covers trigonometric functions and inverse trigonometric functions; solutions of right triangles and oblique triangles; trigonometric identities; trigonometric equations; and vectors.

MAT 111 Pre-Calculus

5 Hours

Prerequisites: MAT 061 and MAT 062 both with a grade of "C" or higher or assessment

5 hours weekly (5-0)

Topics included in this course are functions, graphs, and transformations; polynomial and rational functions; exponential and logarithmic functions; angles, right triangles, and trigonometric functions and their inverses; trigonometric identities and equations; oblique triangles and vectors; conic sections; mathematical induction, and the binomial theorem.

MAT 113 Introduction to Contemporary Mathematics

IAI – M1 904

3 Hours

Prerequisites: MAT 056 OR MAT 062 with a grade of "C" or higher or assessment

3 hours weekly (3-0)

MAT 113 is a general education mathematics course which fulfills 3 hours of the core curriculum's mathematics requirement. Designed particularly for the non-science major, the course focuses on mathematical reasoning and solving of real-life problems, rather than on routine skills. Three or four of the following topics will be studied in depth: counting techniques and probability, game theory, geometry (additional topics beyond the prerequisite), graph theory, linear programming (including functions and graphs), sets and logic, mathematical modeling, the mathematics of finance, and statistics.

MAT 116 Finite Mathematics for Business and Management

IAI – M1 906

3 Hours

Prerequisites: MAT 108 with a grade of "C" or higher or assessment

3 hours weekly (3-0)

While MAT 116 may be used to fulfill part of the 6 hours general education mathematics requirement for the A. S. degree at John A. Logan College, it is designed primarily for

economics, business administration and accounting majors. Those students will be required to take a calculus course to complete their mathematics sequence. MAT 116 will fulfill the mathematics requirement for the A. A. degree. Topics covered include functions and lines, linear systems, linear programming, the Simplex Method, mathematics of finance, set theory, and probability. MAT 116 is not designed for mathematics or science majors.

MAT 117 Calculus for Business and Social Sciences

IAI – M1 900-B

4 Hours

Prerequisites: MAT 108 with a grade of "C" or higher or assessment

4 hours weekly (4-0)

MAT 117 is designed especially for business administration and accounting majors. MAT 117 does not count toward a major or minor in science-related areas. Students who successfully complete this course fulfill the general education mathematics requirement at John A. Logan College. MAT 117 may be taken before or after MAT 116; however, it is recommended that it be taken immediately after College Algebra (MAT 108). Topics covered include graph sketching and recognition, and differentiation and integration of polynomial, rational, exponential, and logarithmic functions. Applications from the worlds of business and social science are emphasized.

MAT 120 Elementary Statistics

IAI – M1 902

3 Hours

Prerequisites: MAT 056 OR MAT 062 with a grade of "C" or higher or assessment

3 hours weekly (3-0)

MAT 120 is a general education mathematics course which fulfills 3 hours of the core curriculum mathematics requirement. The course introduces the basic properties of descriptive and inferential statistics, basic probability theory, probability distributions, graphing, measures of location and variation, linear regression and correlation. Emphasis is placed on the application of statistics, distributions, and regression analysis.

MAT 125 Discrete Structures (Also CPS 202)

IAI – M1 905, IAI – CS 915

3 Hours

Prerequisites: MAT 108 or MAT 111 either with a grade of "C" or higher or assessment

3 hours weekly (3-0)

MAT 125 is a general education mathematics course which fulfills 3 hours of the core curriculum mathematics requirement. Topics include number systems, sets, relations and functions, logic, Boolean algebra, elementary matrix operations, combinations, permutations, counting techniques, and basic concepts of probability, graphs, and trees. **MAT 125 is ordinarily offered in the fall semester in odd numbered years.**

MAT 131 Calculus I

IAI – M1 900-1, IAI – MTH 901

5 Hours

Prerequisites: MAT 109 or MAT 111 either with a grade of "C" or higher or assessment

5 hours weekly (5-0)

MAT 131 will cover the basic concepts and techniques of single variable calculus. Although careful definitions and statements will be given, emphasis on formal proof will be minimal. Topics will include limits and their properties, differentiation of single variable functions, integration of elementary functions, and several applications of differentiation and integration associated with analytic geometry and physics. Students who successfully complete this course fulfill the general education mathematics requirement of John A. Logan College.

MAT 201 Calculus II

IAI – M1 900-2, IAI – MTH 902

5 Hours

Prerequisites: MAT 131 with a grade of "C" or higher.

5 hours weekly (5-0)

MAT 201 is a continuation of MAT 131. Students who successfully complete this course fulfill the general education mathematics requirement of John A. Logan College. Topics include integration, methods of integration, applications of integration, infinite series, power series, polar coordinates, parametric equations, and introduction to three-dimensional and integral calculus.

MAT 202 Calculus III

IAI – M1 900-3, IAI – MTH 903

3 Hours

Prerequisites: MAT 201 with a grade of "C" or higher

3 hours weekly (3-0)

MAT 202 is an introduction to multivariable calculus. Topics include vectors in two and three dimensions; vector operations; planes and lines in space; cylinders, quadric surfaces, and surfaces of revolution; cylindrical and spherical coordinates; vector-valued functions (space curves); limits, continuity, differentiation, differentials, iterated integrals, double integrals, triple integrals and applications of functions of two or three variables; optimization using Lagrange multipliers; directional derivatives, gradients, and the Jacobian.

MAT 205 Differential Equations

IAI – MTH 912

3 Hours

Prerequisites: MAT 201 with a grade of "C" or higher

3 hours weekly (3-0)

MAT 205 is an introduction to differential equations. Topics include standard solution techniques for first order linear, separable, exact, and/or homogeneous equations; standard solution techniques for homogeneous second and higher order equations with constant coefficients; linear independence of solutions; the Wronskian; the methods of reduction of order, undetermined coefficients and variation of parameters; Cauchy-Euler equations; the existence and uniqueness of solutions; the Laplace transform, transfer and impulse response functions. Further topics may

be chosen from system and plane analysis, Newtonian mechanics, RLC circuit analysis, power series methods, numerical methods, stability of solutions, the heat equation and Fourier Series, or Bessel functions. **MAT 205 is offered in the spring semester only.**

MAT 208 Math for Elementary Teachers I

3 Hours

Prerequisites: MAT 061 and MAT 062 both with a grade of "C" or higher or assessment

3 hours weekly (3-0)

MAT 208 is the first of two courses in the mathematics sequence required for elementary and/or special education majors. It covers sequences, problem solving, set theory, logic, numeration systems and whole numbers, integers, number theory, rational numbers, irrational numbers, and the real number system. In order to receive credit, the student must earn a grade of "C" or higher.

MAT 209 Math for Elementary Teachers II

IAI – M1 903

3 Hours

Prerequisites: MAT 208 with a grade of "C" or higher

3 hours weekly (3-0)

MAT 209 is the second of two courses in the mathematics sequence required for elementary and/or special education majors. The completion of the two course sequence (MAT 208 and MAT 209) will meet the general education mathematics core requirement. It includes percent, real numbers, probability, statistics, geometric figures, congruencies, similarities and concepts of measurement (including the metric system). In order to receive credit, the student must earn a grade of "C" or higher.

MAT 221 Introduction to Linear Algebra

IAI – MTH 911

3 Hours

Prerequisites: MAT 201 with a grade of "C" or higher

3 hours weekly (3-0)

MAT 221 is an introduction to the theory and application of linear algebra. Topics include: vectors; operations on matrices; matrices; inverse of a matrix; solution of systems of linear equations; rank of a matrix; vector spaces and subspaces; linear dependence and independence; basis and dimension; linear transformations; sums, composites, inverses of linear transformations; range and kernel of a linear transformation; proof; determinants; eigenvalues and eigenvectors; orthogonality and inner product spaces. Emphasis is placed on the application of linear algebra and formal verification of theoretical properties. Applications include polynomial curve fitting, network analysis, stochastic matrices, Leontief Input-Output models, least squares regression analysis, eigenvalue problems, applications in analytic geometry, and least squares approximations. **MAT 221 is ordinarily offered in the spring semester in even numbered years.**

MAT 282 Statistics

IAI – M1 902

3 Hours

Prerequisites: MAT 108 with a grade of "C" or higher or assessment

3 hours weekly (3-0)

MAT 282 is designed to meet the needs of students requiring a statistics course with a college algebra prerequisite in their programs. Topics include descriptive statistics, including

graphical and numerical, basic probability theory, probability distributions, inferences involving estimation, and hypothesis testing, correlation and regression, and analysis of variance.   This course will include statistical applications in business, nursing, education, social sciences, and STEM fields.