Mathematics (MAT)

MAT 055 Beginning & Intermediate Algebra

5 Hours

Prerequisites: None

5 hours weekly (5-0)

MAT 055 is designed to support students in strengthening their algebra skills. Successful completion of MAT 055 is defined as a "C" or higher. This course covers the properties of real numbers, linear equations and inequalities, graphs of equations – both linear and non-linear equations, slope and equations of lines, exponents, operations with and factoring of polynomials, operations with rational expressions and solving rational equations, operations with radical expressions and solving radical equations and complex numbers.

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

MAT 058 Supportive Skills for Contemporary Mathematics

2 Hours

Prerequisite: Concurrent enrollment in MAT 112

2 hours weekly (2-0)

MAT 058 is a course designed to support students who are not yet ready for MAT 113. This course provides the integrated review for the concurrent MAT 112 transfer course, focusing on supportive skills in three or four of the following topics that will be studied in depth in MAT 112: 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. Concurrent enrollment in MAT 112 is required.

MAT 059 Supportive Skills for Statistics

2 Hours

Prerequisite: Concurrent enrollment in MAT 119

2 hours weekly (2-0)

MAT 059 is a course designed to support students who are not yet ready for Mat 120. This course provides the integrated review for the concurrent MAT 119 transfer course, focusing on supportive skills in the basic properties of descriptive and inferential statistics, basic probability theory, probability distributions, graphing, measures of location and variation, linear regression and correlation. Concurrent enrollment in MAT 119 is required.

MAT 067 Supportive Skills for College Algebra

2 Hours

Prerequisites: MAT 055 with a grade of "C" or higher, or assessment. Concurrent enrollment in MAT 107.

2 hours weekly (2-0)

MAT 067 is a course designed to support students who are not yet ready for MAT 108. This course provides the integrated review for the concurrent MAT 107 transfer course, focusing on supportive skills in the following topics that will be studied in depth in MAT 107: polynomial and rational functions, exponential and logarithmic functions, systems of equations and inequalities, and matrices. Concurrent enrollment in MAT 107 is required.

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

MAT 107 College Algebra with Integrated Review

4 Hours

Prerequisites: MAT 055 with a grade of "C" or higher or assessment. Concurrent enrollment in MAT 067.

4 hours weekly (4-0)

MAT 107 is a general education mathematics course; however, it cannot be taken as the only mathematics course for the AA degree. College Algebra covers functions, graphs, and transformations. This includes an in-depth study of polynomial and rational functions and exponential and logarithmic functions. Systems of equations and inequalities and matrices are also covered.

MAT 108 College Algebra

4 Hours

Prerequisites: 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 covers functions, graphs, and transformations. This included an in-depth study of polynomial and rational functions and exponential and logarithmic functions. Systems of equations and inequalities and matrices are also covered.

MAT 109 College Trigonometry

3 Hours

Prerequisites: MAT 107 OR 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 Precalculus

5 Hours

Prerequisites: Assessment

5 hours weekly (5-0)

Precalculus is an accelerated, combined course including College Algebra (MAT 108) and Trigonometry (MAT 109). The algebra portion of the course covers functions, graphs, and transformations. This includes an in-depth study of polynomial and rational functions and exponential and logarithmic functions. The trigonometry portion of the course covers trigonometric functions and inverse trigonometric functions; solutions of right triangles and oblique triangles; trigonometric identities; trigonometric equations; and vectors.

MAT 112 Introduction to Contemporary Mathematics with Integrated Review

IAI – M1 904

3 Hours

Prerequisite: Concurrent enrollment in MAT 058

3 hours weekly (3-0)

MAT 112 is a co-requisite model of 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. Concurrent enrollment in MAT 058 Supportive Skills for Contemporary Mathematics is required.

MAT 113 Introduction to Contemporary Mathematics

IAI – M1 904

3 Hours

Prerequisites: MAT 055 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 115 Applied Mathematics
3 Hours

Prerequisites: None

3 hours weekly (3-

0)

This course provides a comprehensive foundation in practical mathematics, tailored for students pursuing careers in applied technologies and allied health. It is not designed for college transfer. Topics include arithmetic operations with whole numbers, fractions, decimals, and signed numbers; operations with exponents and roots; ratios, proportions, and percentages; estimation techniques; and basic algebraic expressions and equations. Additionally, the course covers measurement in both the U.S. customary and metric systems, as well as geometric concepts such as perimeter, area, volume, and circumference. Students will develop problem-solving skills and learn to apply mathematical concepts to real-world scenarios relevant to their vocational fields.

MAT 116 Finite Mathematics for Business and Management

IAI – M1 906

3 Hours

Prerequisites: MAT 107 OR 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 107 OR 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 119 Elementary Statistics with Integrated Review

IAI – M1 902

3 Hours

Prerequisite: Concurrent enrollment in MAT 059

3 hours weekly (3-0)

MAT 119 is a co-requisite model of 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. Concurrent enrollment in MAT 059 Supportive Skills for Statistics is required.

MAT 120 Elementary Statistics

IAI – M1 902

3 Hours

Prerequisites: MAT 055 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 107 OR 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

4 Hours

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

4 hours weekly (4-0)

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, the Jacobian, Green's Theorem, the Divergence Theorem, and Stokes's Theorem.

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 210 Math for Elementary Education

IAI – M1 903A

5 Hours

Prerequisites: MAT 055 or assessment.

5 hours weekly (5-0)

MAT 210 is required for elementary and/or special education majors. The completion of this course will meet the general education mathematics core requirement. It includes sequences, problem solving, set theory, numeration systems and whole numbers, integers, number theory, rational numbers, and the real number system, percent, 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 131 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 107 OR 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 geographical 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.