

# MATHEMATICS (MAT)

## **MAT053. College Algebra A. 0 Credits.**

Review. Linear and quadratic equations. Inequalities. Factoring, multiplying and dividing algebraic expressions. Coordinate geometry. Together, this course and MAT153 College Algebra B are equivalent to MAT152 College Algebra.

May not be repeated for credit

## **MAT093. Math Selected Topic. 12 Credits.**

### **Restrictions:**

- Must have the following level: Undergraduate

May be repeated for credit

## **MAT120. College Mathematics. 3 Credits.**

Topics from basic and intermediate algebra are reviewed. Emphasis is on using algebra to solve real world problems from such areas as geometry, finance, business, and science. The concepts of variable and function and the use of formulas will be stressed. Problems will be presented in various formats; graphically, numerically, and symbolically. NOTE: Not to be taken for credit by students with MPL 4 or more.

### **Attributes:**

- Initial College Level Math
- Liberal Arts

### **Restrictions:**

- Must have the following level: Undergraduate

May not be repeated for credit

## **MAT121. College Mathematics with Supplemental Algebra Workshop. 3 Credits.**

Topics from basic and intermediate algebra, with an emphasis on solving real world problems. The concepts of variable and function and the use of formulas will be stressed. This course is similar to MAT120 College Mathematics, but is specifically designed to prepare students to take MAT152 College Algebra. Additional time will be devoted to algebra skills. NOTE: Not to be taken for credit by students with MPL 4 or more.

### **Attributes:**

- Liberal Arts

May not be repeated for credit

## **MAT140. Mathematics for Elementary School Teachers I. 3 Credits.**

First course of a two-semester sequence. Covers problem solving, numeration, number theory, relations, functions, integers, rational and real numbers. Open only to students seeking New York State certification in Elementary Education.

### **Attributes:**

- Liberal Arts

### **Prerequisites:**

- Math Placement Level Minimum Score of 3 or MAT 151 Minimum Grade of C- or MAT120 Minimum Grade of C- or MAT093 Minimum Grade of C- or MAT121 Minimum Grade of C-

May not be repeated for credit

## **MAT142. Paths and Graphs. 3 Credits.**

Designed for visual learners in Liberal and Fine Arts majors. Problems that arise in scheduling, routing and management will be solved by translating them into problems about graphs and then utilizing techniques of elementary graph theory. Fulfills GE Math; not part of any Math major.

### **Attributes:**

- Liberal Arts
- GE3: MATH
- GE4: Mathematics
- Systematic Inquiry

### **Prerequisites:**

- Math Placement Level Minimum Score of 3 or MAT 151 Minimum Grade of C- or MAT093 Minimum Grade of C- or MAT120 Minimum Grade of C- or MAT121 Minimum Grade of C-

May not be repeated for credit

## **MAT143. Mathematics in the Modern World. 3 Credits.**

Designed for non-science majors. Basic mathematical concepts are applied to analyze real world problems in a broad range of fields. Topics may include voting systems, fair division, interpreting statistics, scheduling, routing, linear programming, coding, game theory, patterns and symmetry. Fulfills GE Math; not part of any Math major.

### **Attributes:**

- Liberal Arts
- GE3: MATH
- GE4: Mathematics
- Systematic Inquiry

### **Restrictions:**

- Must have the following level: Undergraduate

### **Prerequisites:**

- Math Placement Level Minimum Score of 3 or MAT 151 Minimum Grade of C- or MAT120 Minimum Grade of C- or MAT093 Minimum Grade of C- or MAT121 Minimum Grade of C-

May not be repeated for credit

**MAT145. Statistics and Public Policy. 3 Credits.**

Fundamental concepts of statistics with an applied approach designed to create savvy "statistical consumers", able to understand, evaluate, and analyze quantitative evidence presented in the media on issues relevant to citizens in our society today. Intended for General Education; not part of any Math major.

**Attributes:**

- Information Literacy
- Liberal Arts
- GE3: MATH
- GE4: Mathematics
- Systematic Inquiry

**Restrictions:**

- Must not be enrolled in the following field(s) of study (major, minor or concentration): Comm Disorders Cert Program (089)

**Prerequisites:**

- Math Placement Level Minimum Score of 3 or MAT 151 Minimum Grade of C- or MAT120 Minimum Grade of C- or MAT093 Minimum Grade of C- or MAT121 Minimum Grade of C-

May not be repeated for credit

**MAT152. College Algebra. 3 Credits.**

Factoring, multiplying and dividing algebraic expressions, coordinate geometry, functions and functional notation, polynomials, exponents, logarithms, and inequalities. Primarily preparation for more advanced courses, but also open to students desiring a background in college algebra. NOTE: Not to be taken for credit by students with MPL 4 or more.

**Attributes:**

- Liberal Arts
- GE3: MATH
- GE4: Mathematics
- Systematic Inquiry

**Prerequisites:**

- Math Placement Level Minimum Score of 3 or MAT 151 Minimum Grade of C- or MAT053 Minimum Grade of C- or MAT120 Minimum Grade of C- or MAT121 Minimum Grade of C-

May not be repeated for credit

**MAT153. College Algebra B. 3 Credits.**

Function notation, domain and range, graphing basic functions, transformations, inverse functions. Systems of linear and nonlinear equations. Together, MAT053 College Algebra A and this course are equivalent to MAT152 College Algebra.

**Attributes:**

- Liberal Arts
- GE3: MATH
- GE4: Mathematics
- Systematic Inquiry

**Restrictions:**

- Must have the following level: Undergraduate

**Prerequisites:**

- MAT053 Minimum Grade of C-

May not be repeated for credit

**MAT171. Mathematical Methods for Business. 3 Credits.**

Linear equations and inequalities, functions and graphs, the exponential and logarithmic functions, the mathematics of finance, graphs and rates of change, tabular and graphical analysis, systems of linear equations. NOTE: Not to be taken for credit by students intending to take MAT251 (Calculus I).

**Attributes:**

- Liberal Arts
- GE3: MATH
- GE4: Mathematics
- Systematic Inquiry

**Restrictions:**

- Must have the following level: Undergraduate
- Must be enrolled in the following field(s) of study (major, minor or concentration):
  - Accounting (542)
  - Business (BUS)
  - Business Analytics (531)
  - Finance (543)
  - General Business (547)
  - International Business (546)
  - Management (544)
  - Marketing (545)
  - Undeclared:Business (000B)
  - Undeclared:Pre-Accounting (00AC)
  - Undeclared:Pre-Bus Analytics (00BN)
  - Undeclared:Pre-Entrepreneurshi (00ER)
  - Undeclared:Pre-Finance (00FI)
  - Undeclared:Pre-Gen Business (00GB)
  - Undeclared:Pre-Interntnl Bus (00IB)
  - Undeclared:Pre-Management (00MG)
  - Undeclared:Pre-Marketing (00MK)

**Prerequisites:**

- Math Placement Level Minimum Score of 4 or MAT152 Minimum Grade of C- or MAT153 Minimum Grade of C-

May not be repeated for credit

**MAT181. Precalculus. 4 Credits.**

Topics needed for calculus: brief review of algebra; polynomial, exponential, logarithmic and trigonometric functions; trigonometry; remainder and factor theorems; complex numbers; solving exponential equations, logarithmic equations and trigonometric equations.

**Attributes:**

- Liberal Arts
- GE3: MATH
- GE4: Mathematics
- Systematic Inquiry

**Prerequisites:**

- Math Placement Level Minimum Score of 4 or MAT152 Minimum Grade of C- or MAT193 Minimum Grade of C- or MAT153 Minimum Grade of C-

May not be repeated for credit

**MAT184. Elements of Geometry. 3 Credits.**

Topics chosen from history of geometry, axioms for Euclidean geometry and geometric proof, practical applications of geometry, solid geometry, polygons and tessellations of the plane. Intended for General Education; not part of any Math major.

**Attributes:**

- Liberal Arts
- GE3: MATH
- GE4: Mathematics
- Systematic Inquiry

**Prerequisites:**

- Math Placement Level Minimum Score of 3 or MAT 151 Minimum Grade of C- or MAT093 Minimum Grade of C- or MAT120 Minimum Grade of C- or MAT121 Minimum Grade of C-

May not be repeated for credit

**MAT186. Infinity. 3 Credits.**

An elementary introduction to mathematical infinity and its uses. Notation for infinite sets and sequences. Difference equations. Method of exhaustion. Cardinals, ordinals, and equipotence. Independence of the Continuum Hypothesis. Intended for General Education; not part of any Math major.

**Attributes:**

- Liberal Arts
- GE3: MATH
- GE4: Mathematics
- Systematic Inquiry

**Prerequisites:**

- Math Placement Level Minimum Score of 3 or MAT 151 Minimum Grade of C- or MAT093 Minimum Grade of C- or MAT120 Minimum Grade of C- or MAT121 Minimum Grade of C-

May not be repeated for credit

**MAT193. Math Selected Topic. 3-12 Credits.**

Selected topics courses are regularly scheduled courses that focus on a particular topic of interest. Descriptions are printed in the Schedule of Classes each semester. Selected topics courses may be used as elective credit and may be repeated for credit, provided that the topic of the course changes.

May be repeated for credit

**MAT240. Mathematics for Elementary School Teachers II. 3 Credits.**

Second course of a two-semester sequence. Covers problem solving, logic, probability, statistics, analysis of geometric shapes and solids, measurement, congruence, similarity, constructions, coordinate geometry, and transformations. Open only to students seeking New York State certification in Elementary Education.

**Attributes:**

- Liberal Arts
- GE3: MATH
- GE4: Mathematics
- Systematic Inquiry

**Prerequisites:**

- MAT140 Minimum Grade of C-
- Math Placement Level Minimum Score of 3 or MAT 151 Minimum Grade of C- or MAT093 Minimum Grade of C- or MAT121 Minimum Grade of C- or MAT120 Minimum Grade of C-

May not be repeated for credit

**MAT241. Introduction to Statistics. 3 Credits.**

Descriptive statistics, measure of central tendency and dispersion, population parameters and sample statistics, use of probability distributions for statistical inference, binomial and normal distributions, introduction to hypothesis testing. Designed for non-mathematics majors. Not open to students who have taken MAT381 or MAT382.

**Attributes:**

- Liberal Arts
- GE3: MATH
- GE4: Mathematics
- Systematic Inquiry

**Restrictions:**

- Must not be enrolled in the following field(s) of study (major, minor or concentration): Comm Disorders Cert Program (089)

**Prerequisites:**

- Math Placement Level Minimum Score of 4 or MAT152 Minimum Grade of C- or MAT193 Minimum Grade of C- or MAT153 Minimum Grade of C-

May not be repeated for credit

**MAT251. Calculus I. 4 Credits.**

Single-variable calculus: limits, continuity, derivatives, extrema and other applications, mean value theorem, integrals, fundamental theorem of calculus.

**Attributes:**

- Liberal Arts
- GE3: MATH
- GE4: Mathematics

**Prerequisites:**

- Math Placement Level Minimum Score of 5 or MAT181 Minimum Grade of C-

May not be repeated for credit

**MAT252. Calculus II. 4 Credits.**

A continuation of Calculus I. Techniques of integration, applications of the integral, infinite sequences and series, parametric equations, polar coordinates.

**Attributes:**

- Liberal Arts

**Prerequisites:**

- Math Placement Level Minimum Score of 6 or MAT251 Minimum Grade of C-

May not be repeated for credit

**MAT260. Introduction to Proof. 3 Credits.**

Focus on basic principles of logic, set theory, functions, and the development of mathematical reasoning. Introduction to basic techniques in writing proofs.

**Attributes:**

- Critical Thinking Introductory
- Liberal Arts

**Prerequisites:**

- Math Placement Level Minimum Score of 6 or MAT251 Minimum Grade of C-

May not be repeated for credit

**MAT293. Math Selected Topic. 3-12 Credits.**

Selected topics courses are regularly scheduled courses that focus on a particular topic of interest. Descriptions are printed in the Schedule of Classes each semester. Selected topics courses may be used as elective credit and may be repeated for credit, provided that the topic of the course changes.

May be repeated for credit

**MAT295. Indep Study Math. 12 Credits.**

May be repeated for credit

**MAT303. Foundations of Analysis. 3 Credits.**

Order, algebraic and completeness axioms of the numbers, topology of the real line, lubs and glbs, limit points, Heine-Borel Theorem, sequences and convergence.

**Attributes:**

- Critical Thinking Intermediate
- Information Mgmt Intrmd
- Liberal Arts

**Prerequisites:**

- MAT260 Minimum Grade of B-
- MAT252 Minimum Grade of C-

May not be repeated for credit

**MAT304. Foundations of Algebra. 3 Credits.**

Equivalence relations, elementary number theory, mathematical induction and recursion; the group of integers modulo-n and other concrete groups.

**Attributes:**

- Liberal Arts

**Restrictions:**

- Must have the following level: Undergraduate

**Prerequisites:**

- MAT260 Minimum Grade of C-
- MAT252 Minimum Grade of C-

May not be repeated for credit

**MAT310. Number Theory. 3 Credits.**

Introductory study of integers. Axiomatic approach to order and divisibility property, prime distributions, modular arithmetics, perfect numbers and other topics.

**Attributes:**

- Liberal Arts
- Writing Intensive

**Restrictions:**

- Must not be enrolled in the following class: Freshman

**Prerequisites:**

- MAT304 Minimum Grade of C-

May not be repeated for credit

**MAT320. Discrete Mathematics for Computing. 3 Credits.**

This course is designed to provide Computer Science and Computer Engineering majors with a working knowledge of discrete mathematics topics they will need in future courses and in later work. Does not count towards the Mathematics major.

**Attributes:**

- Liberal Arts

**Restrictions:**

- Must not be enrolled in the following field(s) of study (major, minor or concentration): Mathematics (512)

**Prerequisites:**

- EGC220 Minimum Grade of C- or EGC 230 Minimum Grade of C- or CPS310 Minimum Grade of C-

May not be repeated for credit

**MAT331. Axiomatic Geometry. 3 Credits.**

Axiomatic development of geometry from a modern standpoint. Topics chosen from incidence, betweenness, congruence, similarity, transformations, constructions; measure of areas, angles and circles.

**Attributes:**

- Liberal Arts
- Writing Intensive

**Prerequisites:**

- MAT260 Minimum Grade of C-
- MAT251 Minimum Grade of C-

May not be repeated for credit

**MAT332. Modern Geometry. 3 Credits.**

Euclidean and non-Euclidean geometries. Consistency proofs and Euclidean constructions.

**Attributes:**

- Liberal Arts

**Restrictions:**

- Must not be enrolled in the following class: Freshman

**Prerequisites:**

- MAT331 Minimum Grade of C-

May not be repeated for credit

**MAT341. Applied Mathematics I. 3 Credits.**

The first of two-semester sequence for mathematicians, scientists and engineers. Topics include partial derivatives, ordinary differential equations, infinite series, and matrix algebra. Credit will not be given for both MAT341 and MAT359.

**Attributes:**

- Liberal Arts

**Restrictions:**

- Must not be enrolled in the following class: Freshman
- Must not be enrolled in the following field(s) of study (major, minor or concentration): Mathematics (512)

**Prerequisites:**

- MAT252 Minimum Grade of C-

May not be repeated for credit

**MAT342. Applied Mathematics II. 3 Credits.**

The second of a two-semester sequence in advanced mathematics for scientists and engineers. Topics include Fourier series and transforms, partial differential equations and special functions of mathematical physics. Counts as an upper-division elective in the Mathematics major.

**Attributes:**

- Liberal Arts

**Restrictions:**

- Must not be enrolled in the following class: Freshman

**Prerequisites:**

- MAT341 Minimum Grade of C- or (MAT359 Minimum Grade of C- and MAT362 Minimum Grade of C-)

May not be repeated for credit

**MAT353. Calculus III. 4 Credits.**

Analytic geometry in 3 dimensions, vector-valued functions, multivariate functions, partial derivatives, multiple integrals, applications, line integrals, Green's theorem, divergence, curl.

**Attributes:**

- Liberal Arts

**Prerequisites:**

- MAT252 Minimum Grade of C-

May not be repeated for credit

**MAT354. Calculus IV. 3 Credits.**

Fourth semester covering differential and integral calculus. Emphasizes line and surface integral theorems, sequences, and series.

**Attributes:**

- Liberal Arts

**Prerequisites:**

- MAT353 Minimum Grade of C-

May not be repeated for credit

**MAT359. Ordinary Differential Equations. 3 Credits.**

Methods of solution of homogeneous and non-homogeneous linear differential equations. Power series and Laplace transform methods. Non-linear equations of order one. Applications. Credit will not be given for both MAT341 and MAT359.

**Attributes:**

- Liberal Arts

**Prerequisites:**

- MAT252 Minimum Grade of C-

May not be repeated for credit

**MAT362. Linear Algebra. 3 Credits.**

Systems of linear equations, matrices, determinants, eigenvalues, eigenvectors, finite dimensional vector spaces and linear transformations.

**Attributes:**

- Liberal Arts

**Prerequisites:**

- MAT252 Minimum Grade of C-

May not be repeated for credit

**MAT363. Combinatorics. 3 Credits.**

Counting arguments in different settings and their relation to probability. Functions, relations and, in particular, graphs and trees.

**Attributes:**

- Liberal Arts

**Prerequisites:**

- MAT260 Minimum Grade of C-

May not be repeated for credit

**MAT366. Nonlinear Dynamics. 3 Credits.**

A study where the change of the output is not proportional to the change of the input. In the real world, systems are typically nonlinear.

**Attributes:**

- Liberal Arts

**Restrictions:**

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman

**Prerequisites:**

- MAT341 Minimum Grade of C- or MAT359 Minimum Grade of C-

May not be repeated for credit

**MAT375. Numerical Methods. 3 Credits.**

Computer solution of mathematical problems; round-off errors and computer arithmetic, solution of equations, interpolation and approximation, numerical differentiation and integration, direct and iterative techniques in matrix algebra.

**Attributes:**

- Liberal Arts

**Restrictions:**

- Must not be enrolled in the following class: Freshman

**Prerequisites:**

- MAT362 Minimum Grade of C-
- CPS210 Minimum Grade of C-

May not be repeated for credit

**MAT380. Applied Probability and Statistics. 3 Credits.**

This course will provide students with an understanding of the principles of engineering data analysis using basic probability theorems and statistical methods with emphasis on their application to real-world data processing problems.

**Attributes:**

- Liberal Arts

**Restrictions:**

- Must have the following level: Undergraduate
- Must be enrolled in the following field(s) of study (major, minor or concentration):
  - Computer Engineering (518)
  - Electrical Engineering (517)
  - Mechanical Engineering (521)

**Prerequisites:**

- MAT252 Minimum Grade of C-

May not be repeated for credit

**MAT381. Probability and Statistics I. 3 Credits.**

Counting techniques, conditional probability, Bayes' theorem, discrete and continuous random variables, distribution functions, expected value, joint distributions, limit theorems, sampling distributions and hypothesis testing.

**Attributes:**

- Liberal Arts

**Prerequisites:**

- MAT252 Minimum Grade of C-

May not be repeated for credit

**MAT382. Probability and Statistics II. 3 Credits.**

Introduction to probability theory and statistics. Random variables; distribution functions; expected value and moments; sampling; point estimation; interval estimation; hypothesis testing.

**Attributes:**

- Liberal Arts

**Restrictions:**

- Must not be enrolled in the following class: Freshman

**Prerequisites:**

- MAT381 Minimum Grade of C-
- MAT353 Minimum Grade of C-

May not be repeated for credit

**MAT393. Math Selected Topic. 3-12 Credits.**

Selected topics courses are regularly scheduled courses that focus on a particular topic of interest. Descriptions are printed in the Schedule of Classes each semester. Selected topics courses may be used as elective credit and may be repeated for credit, provided that the topic of the course changes.

**Restrictions:**

- Must not be enrolled in the following class: Freshman

May be repeated for credit

**MAT399. Modular Course. 0 Credits.****Restrictions:**

- Must not be enrolled in the following class: Freshman

May be repeated for credit

**MAT431. Real Analysis I. 3 Credits.**

Theoretical foundations of elementary calculus: continuity, derivatives, integrals, classical theorems of calculus such as the Mean Value theorem and the Fundamental Theorem of calculus.

**Attributes:**

- Liberal Arts

**Restrictions:**

- Must not be enrolled in the following class: Freshman

**Prerequisites:**

- MAT303 Minimum Grade of C-
- MAT353 Minimum Grade of C-

May not be repeated for credit

**MAT432. Real Analysis II. 3 Credits.**

Series of real numbers; sequences and series of functions; uniform convergence; power series; Taylor Series, additional topics as chosen by the instructor.

**Attributes:**

- Liberal Arts

**Restrictions:**

- Must not be enrolled in the following class: Freshman

**Prerequisites:**

- MAT 321 Minimum Grade of C- or MAT431 Minimum Grade of C-

May not be repeated for credit

**MAT441. Abstract Algebra I. 3 Credits.**

Group theory from axioms; subgroups, cyclic groups, number theoretic properties of finite groups, quotient groups, isomorphisms and homomorphisms.

**Attributes:**

- Critical Thinking Advanced
- Information Mgmt Advanced
- Liberal Arts

**Restrictions:**

- Must not be enrolled in the following class: Freshman

**Prerequisites:**

- MAT304 Minimum Grade of C-
- MAT362 Minimum Grade of C-

May not be repeated for credit

**MAT442. Abstract Algebra II. 3 Credits.**

Elementary theory of groups and rings, integral domains and fields.

**Attributes:**

- Liberal Arts

**Restrictions:**

- Must not be enrolled in the following class: Freshman

**Prerequisites:**

- MAT441 Minimum Grade of C- or MAT 364 Minimum Grade of C-

May not be repeated for credit

**MAT483. Actuarial Mathematics. 3 Credits.**

Theories and models of risk, and their applications. Topics may include: annuities, insurance, benefit reserves, multiple life functions, multiple decrement models, and collective risk models.

**Attributes:**

- Liberal Arts

**Restrictions:**

- Must not be enrolled in the following class: Freshman

**Prerequisites:**

- MAT381 Minimum Grade of C-

May not be repeated for credit

**MAT488. Partial Differential Equations. 3 Credits.**

Classification of linear second order partial differential equations (PDE), diffusion-type problems, Fourier sine and cosine transforms. Laplace transform solutions, method of characteristics, elliptic-type problems, Green's functions, numerical and approximate methods.

**Attributes:**

- Liberal Arts

**Restrictions:**

- Must not be enrolled in the following class: Freshman

**Prerequisites:**

- MAT359 Minimum Grade of C-

May not be repeated for credit

**MAT490. Research in Mathematics. 1-12 Credits.**

Individual research in Mathematics under faculty supervision. Interested students should contact the department or approach a particular professor.

**Restrictions:**

- Must have the following level: Undergraduate
- Must not be enrolled in the following class: Freshman

May be repeated for credit

**MAT493. Math Selected Topic. 1-12 Credits.**

Selected topics courses are regularly scheduled courses that focus on a particular topic of interest. Descriptions are printed in the Schedule of Classes each semester. Selected topics courses may be used as elective credit and may be repeated for credit, provided that the topic of the course changes.

**Restrictions:**

- Must not be enrolled in the following class: Freshman

May be repeated for credit

**MAT494. Fieldwork in Mathematics. 1-12 Credits.**

Individual research in Mathematics under faculty supervision. Interested students should contact the department or approach a particular professor.

**Restrictions:**

- Must not be enrolled in the following class: Freshman

May be repeated for credit

**MAT495. Indep Study Math. 1-12 Credits.****Attributes:**

- Liberal Arts

**Restrictions:**

- Must not be enrolled in the following class: Freshman

May be repeated for credit