Mathematics

Phone: (845) 257-3532
Location: Faculty Office Building Room E-2

The Department of Mathematics offers undergraduate majors in Mathematics, Adolescence Education Mathematics and Early Childhood & Childhood Education Mathematics. Graduates with the Mathematics major go on to do graduate work in mathematics and other fields requiring strong quantitative and reasoning skills. Those graduating from the Adolescence Education program have a depth of knowledge that underlies the courses they will teach. Early Childhood & Childhood Education majors go on to become mathematics specialists within the primary schools. (See Adolescence Education [https://www.newpaltz.edu/ugc/education/secondaryed/majors.html] and Early Childhood & Childhood Education [http://catalog.newpaltz.edu/undergraduate/majors-minors/education/early-childhood-childhood-education] for details about these programs.) Minors in Mathematics and Applied Mathematics are also offered.

Those interested in any of these programs are invited to request a faculty adviser in the Department of Mathematics. Upon completion of Calculus I and Introduction to Proof with an average grade of at least B-, a student can declare one of the above majors. A letter grade of at least C- is required to count a course toward any mathematics major or as a prerequisite for another mathematics course.

Math Placement Levels (MPLs)

All students enrolling in SUNY New Paltz are assigned a Math Placement Level (MPL), indicating their current level of mathematics proficiency. The MPLs are used to help place students in courses which they will need to succeed in subsequent work and have not yet mastered. See the table below for more detailed information.

<table>
<thead>
<tr>
<th>MPL</th>
<th>Meaning</th>
<th>Courses that will raise level¹ or take this MP Exam:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Deficiency in Fundamental Skills</td>
<td>MAT151 College Math (3) Basic Algebra</td>
</tr>
<tr>
<td>2</td>
<td>Deficiency in College Level Mathematics Skills</td>
<td>MAT151 College Math (3), MAT152 College Algebra (4)</td>
</tr>
<tr>
<td>3</td>
<td>Ready for some General Education MATH courses (see specific prerequisites)</td>
<td>MAT152 College Algebra (4)</td>
</tr>
<tr>
<td>4</td>
<td>Prepared for Precalculus or any General Education MATH course</td>
<td>MAT181 Precalculus (5), MAT245 Basic Calculus (5)</td>
</tr>
<tr>
<td>5</td>
<td>General Education MATH requirement met for GEII; ready for Calculus I (MAT251)</td>
<td>MAT251 Calculus I (6)</td>
</tr>
</tbody>
</table>

¹ i.e., a grade of C- or better will raise student’s MPL to (x).

Major


Minors


Undergraduate

MAT052. College Algebra Workshop . 0 Credits.
Will provide extra support for those students taking College Algebra that need additional review of background topics.

MAT053. College Algebra A. 0 Credits.
Review. Linear and quadratic equations. Inequalities. Factoring, multiplying and dividing algebraic expressions. Coordinate geometry, together, this course and MAT 153 College Algebra B are equivalent to MAT 152 College Algebra.

MAT093. Math Selected Topic. 12 Credits.

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.

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 MAT 120 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.

MAT140. Mathematics for Elementary School Teachers I. 3 Credits.
First course of a two-semester sequence covering problem solving, numeration, number theory, relations, functions, integers, rational and real numbers, statistics, probability, and the use of the calculator. Open to students seeking New York State certification in Elementary Education.

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.
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.

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.

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.

MAT153. College Algebra B. 3 Credits.  
Function notation, domain and range, graphing basic functions, transformations, inverse functions. Systems of linear and nonlinear equations. Together, MAT 053 College Algebra A and this course are equivalent to MAT 152 College Algebra.

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 and matrices. NOTE: Not to be taken for credit by students intending to take MAT251 (Calculus I).

MAT181. Precalculus. 4 Credits.  
Topics needed for calculus: brief review of algebra; polynomial, exponential, logarithmic and trigonometric functions; trigonometry; binomial theorem; remainder and factor theorems; introduction to complex numbers; solving exponential equations, logarithmic equations and trigonometric equations.

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.

MAT186. Infinity. 3 Credits.  

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.

MAT240. Mathematics for Elementary School Teachers II. 3 Credits.  
Second course of a two-semester sequence covering problem solving, logic, analysis of geometric shapes and solids, measurement, congruence, similarity, constructions, coordinate geometry, transformations, programming in LOGO, and the use of the calculator. Open only to students seeking New York State certification in Elementary Education.

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.

MAT251. Calculus I. 4 Credits.  
Single-variable calculus: limits, continuity, derivatives, extrema and other applications, mean value theorem, integrals, fundamental theorem of calculus.

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, separable differential equations.

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.

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.

MAT295. Indep Study Math. 12 Credits.  

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.

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.

MAT310. Elementary Number Theory. 3 Credits.  
Introductory study of integers. Axiomatic approach to order and divisibility property, prime distributions, modular arithmetics, perfect numbers and other topics.

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.

MAT321. Intermediate 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.

MAT322. Intermediate 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.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAT331</td>
<td>Axiomatic Geometry</td>
<td>3</td>
<td>Axiomatic development of geometry from a modern standpoint. Topics chosen from incidence, betweenness, congruence, similarity, transformations, constructions; measure of areas, angles and circles.</td>
</tr>
<tr>
<td>MAT332</td>
<td>Modern Geometry</td>
<td>3</td>
<td>Euclidean and non-Euclidean geometries. Consistency proofs and Euclidean constructions.</td>
</tr>
<tr>
<td>MAT334</td>
<td>Applied Mathematics I</td>
<td>3</td>
<td>The first of two-semester sequence for mathematicians, 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.</td>
</tr>
<tr>
<td>MAT335</td>
<td>Calculus III</td>
<td>4</td>
<td>Analytic geometry in 3 dimensions, vector-valued functions, multivariate functions, partial derivatives, multiple integrals, applications, line integrals, Green's theorem, divergence, curl.</td>
</tr>
<tr>
<td>MAT337</td>
<td>Linear Algebra</td>
<td>3</td>
<td>Systems of linear equations, matrices, determinants, eigenvalues, eigenvectors, finite dimensional vector spaces and linear transformations.</td>
</tr>
<tr>
<td>MAT338</td>
<td>Combinatorics</td>
<td>3</td>
<td>Counting arguments in different settings and their relation to probability. Functions, relations and, in particular, graphs and trees.</td>
</tr>
<tr>
<td>MAT339</td>
<td>Introduction to Abstract Algebra I</td>
<td>3</td>
<td>Group theory from axioms; subgroups, cyclic groups, number theoretic properties of finite groups, quotient groups, isomorphisms and homomorphisms.</td>
</tr>
<tr>
<td>MAT340</td>
<td>Introduction to Abstract Algebra II</td>
<td>3</td>
<td>Elementary theory of groups and rings, integral domains and fields.</td>
</tr>
<tr>
<td>MAT341</td>
<td>Numerical Methods</td>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>MAT342</td>
<td>Applied Probability and Statistics</td>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>MAT343</td>
<td>Probability and Statistics I</td>
<td>3</td>
<td>Introduction to probability theory and statistics. Random variables; distribution functions; expected value and moments; sampling; point estimation; interval estimation; hypothesis testing.</td>
</tr>
<tr>
<td>MAT344</td>
<td>Probability and Statistics II</td>
<td>3</td>
<td>Introduction to probability theory and statistics. Random variables; distribution functions; expected value and moments; sampling; point estimation; interval estimation; hypothesis testing.</td>
</tr>
<tr>
<td>MAT345</td>
<td>Calculus IV</td>
<td>3</td>
<td>Fourth semester covering differential and integral calculus. Emphasizes line and surface integral theorems, sequences, and series.</td>
</tr>
<tr>
<td>MAT346</td>
<td>Math Selected Topic</td>
<td>3-12</td>
<td>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.</td>
</tr>
<tr>
<td>MAT347</td>
<td>Modular Course</td>
<td>0</td>
<td>Individual research in Mathematics under faculty supervision. Interested students should contact the department or approach a particular professor.</td>
</tr>
<tr>
<td>MAT348</td>
<td>Actuarial Mathematics</td>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>MAT349</td>
<td>Partial Differential Equations</td>
<td>3</td>
<td>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.</td>
</tr>
<tr>
<td>MAT350</td>
<td>Research in Mathematics</td>
<td>1-12</td>
<td>Individual research in Mathematics under faculty supervision. Interested students should contact the department or approach a particular professor.</td>
</tr>
<tr>
<td>MAT351</td>
<td>Indep Study Math</td>
<td>1-12</td>
<td>Individual research in Mathematics under faculty supervision. Interested students should contact the department or approach a particular professor.</td>
</tr>
</tbody>
</table>