MATHEMATICS (MATH)

MATH 090 Fundamentals of Mathematics 3.00
Review of pre-algebra mathematics with an introduction to basic algebra. Topics include: real numbers, with an emphasis on fractions and decimals; percent notation; exponents; ratios, rates, and proportions; algebraic expressions; solving equations and inequalities; polynomials; factoring integers; and an introduction to graphing linear equations. Does not apply toward University Studies requirements or graduation requirements.
Typically Offered:
- On-campus: Fall & Spring
- Online: Fall & Spring

MATH 092 Fundamentals of Algebra for Math 112 1.00
This corequisite support course is designed to provide students with the tools and strategies needed to be successful in MATH 112. Through targeted review and practice, students will strengthen their skills in mathematics and develop effective study habits that will enhance their learning experience. This course offers just-in-time support, aligning with the content and concepts being taught in MATH 112, ensuring students receive immediate assistance when they encounter challenges. Topics will include study skills, problem-solving techniques, mathematical reasoning, and critical thinking strategies. Does not apply toward University Studies requirements or graduation requirements.
Prerequisites:

MATH 090 with a grade of C- or better or an acceptable score on the Math Placement test and concurrent enrollment in MATH 112.

Typically Offered:
- On-campus: Fall & Spring
- Online: Fall & Spring

MATH 093 Fundamentals of Algebra for Math 130 1.00
This corequisite support course is designed to provide students with the tools and strategies needed to be successful in MATH 130. Through targeted review and practice, students will strengthen their skills in statistics and develop effective study habits that will enhance their learning experience. This course offers just-in-time support, aligning with the content and concepts being taught in MATH 130, ensuring students receive immediate assistance when they encounter challenges. Topics will include study skills, problem-solving techniques, mathematical reasoning, and critical thinking strategies. Does not apply toward general education requirements or graduation requirements.
Prerequisites:

MATH 090 with a grade of C- or better or an acceptable score on the Math Placement test and concurrent enrollment in MATH 130

Typically Offered:
- On-campus: Fall & Spring
- Online: Spring

MATH 096 Fundamentals of Algebra for MATH 113 (Algebra with Applications) 3.00
This course supports MATH 113 by reviewing topics from elementary algebra. Typically, topics include: the real number system; functions; linear equations and inequalities and their graphs; systems of linear equations; polynomials, factoring polynomials; rational expressions; rational exponents; radical expressions. Does not apply toward University Studies requirements or graduation requirements.
Prerequisites:

MATH 090 with a grade of C- or better or an acceptable score on the Math Placement test and concurrent enrollment in MATH 113

Typically Offered:
- On-campus: Fall & Spring
- Online: Fall

MATH 112 Introduction to Contemporary Mathematics 3.00
A liberal arts mathematics course emphasizing the importance of mathematics to a variety of fields. Applications are used to show how mathematical problem solving contributes to decision making in all areas of society. Content may be chosen from various fields in math such as graph theory, voting theory, probability, statistics, geometry, logic, mathematics of growth, financial mathematics, and mathematical modeling.
Prerequisites:

Adequate math placement score or concurrent enrollment in MATH 092 or completion of the developmental math milestone.

Core General Education Requirement:
- MQR - Mathematics & Quantitative Reasoning

Typically Offered:
- On-campus: Fall & Spring
- Online: Fall & Spring

MATH 113 Algebra with Applications 3.00
Algebraic concepts, problem-solving techniques, and applications for students in business, natural and social sciences. Topics include linear, quadratic, exponential, logarithmic functions and their graphs; equations and inequalities; systems of equations and complex numbers.
Prerequisites:

Adequate Math Placement Score or concurrent enrollment in Math 096

Core General Education Requirement:
- MQR - Mathematics & Quantitative Reasoning

Typically Offered:
- On-campus: Fall & Spring
- Online: Fall

MATH 115 Precalculus 4.00
Covers the algebra and trigonometry required for the Calculus sequence. Topics include functions (composite, inverse, polynomial, rational, exponential, logarithmic, and trigonometric); partial fractions; trigonometric identities; inequalities; complex numbers; and solving equations.
Prerequisites:

Adequate math placement score or completion of MATH 113 with a C- or better.

Core General Education Requirement:
- MQR - Mathematics & Quantitative Reasoning

Typically Offered:
- On-campus: Fall & Spring
- Online: Spring

MATH 130 Elementary Statistics 4.00
Introductory course for students of all disciplines. Includes descriptive statistics, probability, the binomial and normal distributions, confidence intervals, correlation and linear regression, Central Limit Theorem, and one-sample (population mean and population proportion) and two-sample (population means) hypothesis testing. Problems are taken from various fields of study dependent on statistical decision making.
Prerequisites:

Adequate math placement score or concurrent enrollment in Math 093 or completion of the developmental math milestone

Core General Education Requirement:
- MQR - Mathematics & Quantitative Reasoning

Typically Offered:
- On-campus: Fall & Spring
- Online: Fall & Spring

MATH 150 Finite Mathematics 3.00
Introduction to mathematical concepts and problem-solving techniques especially applicable in business and economics. Topics include: financial mathematics, systems of linear equations and matrices; linear inequalities, linear programming; sets and counting techniques; fundamentals of probability.
Prerequisites:

Adequate math placement score or completion of MATH 113 with a C- or better.

Core General Education Requirement:
- MQR - Mathematics & Quantitative Reasoning

Typically Offered:
- On-campus: Fall & Spring
- Online: Fall & Spring

MATH 151 Calculus for Business, Life, and Social Sciences 3.00
A short course in calculus including concepts and problem-solving techniques for students in business, economics, biology and the social sciences. Topics include review of algebraic, exponential and logarithmic functions; limits, derivatives and optimization problems; integrals; and partial derivatives.
Prerequisites:

Adequate math placement score or completion of MATH 113 with a C- or better.

Core General Education Requirement:
- MQR - Mathematics & Quantitative Reasoning

MATH 189 Mathematics Elective 1.00
Transfer credits ONLY from another accredited institution not equivalent to a UW-S course.

MATH 189MC Mathematics Elective Math/Computer Science 1.00
Transfer credits ONLY from another accredited institution not equivalent to a UW-S course.

MATH 240 Calculus and Analytic Geometry I 4.00
A first course in the fundamentals of calculus. Topics include: real numbers; functions; limits; continuity; derivatives, integrals; the use of computational tools in calculus; transcendental functions; and applications.
Prerequisites:

Adequate math placement score or completion of MATH 115 with a C- or better.

Core General Education Requirement:
- MQR - Mathematics & Quantitative Reasoning

Typically Offered:
- On-campus: Fall & Spring
- Online: Fall

MATH 241 Calculus and Analytic Geometry II 4.00
Continuation of MATH 240. Topics include: conic sections; techniques and applications of integration; parametric curves and polar coordinates; indeterminate forms; improper integrals; and infinite series.
Prerequisites:

Completion of MATH 240 with a grade of C- or better.

Typically Offered:
- On-campus: Spring;

MATH 242 Calculus and Analytic Geometry III 4.00
Continuation of MATH 241. Topics include: three-dimensional analytic geometry; vectors; partial derivatives; multiple integrals; line integrals; and surface integrals; Green's, Stokes, and Divergence Theorems.
Prerequisites:

Completion of MATH 241 with a grade of C- or better.

Typically Offered:
- On-Campus: Fall;

MATH 289 Mathematics Elective 1.00
Transfer credits ONLY from another accredited institution not equivalent to a UW-S course.

MATH 289MC Math Elective Math/Computer Science 1.00
Transfer credits ONLY from another accredited institution not equivalent to a UW-S course.

MATH 289MQ Transfer credits ONLY from another accredited institution not equivalent to a UW-S course. 1.00
Transfer credits ONLY from another accredited institution not equivalent to a UW-S course.
Core General Education Requirement:
- MQR - Mathematics & Quantitative Reasoning

MATH 310 Introduction to Abstract Mathematics 3.00
Fundamentals of formal mathematics emphasizing mathematical writing and types of formal proof. Includes significant coverage of topics in logic, set theory, basic number theory, relations and functions.
Prerequisites:

Completion of MATH 115 or adequate math placement.

Typically Offered:
- On-campus: Fall & Spring
- Online: Fall & Spring

MATH 315 Linear Algebra 3.00
Introduction to the algebra and geometry of two-and three-dimensional real vector space and extension to n-dimensional space. Topics include: line and coordinate vectors; systems of linear equations and their solution by reduction methods; matrix algebra; determinants; fundamentals of abstract vector spaces; linear independence, dimension theorems; linear transformations; eigenvalues and eigenvectors; diagonal matrices; quadratic forms; inner products; and the Gram-Schmidt orthogonalization.
Prerequisites:

Successful completion of MATH 310.

Typically Offered:
- On-campus: Spring;

MATH 320 Discrete Structures 4.00
Introduction to the algebra and geometry of two-and three-dimensional real vector space and extension to n-dimensional space. Topics include: line and coordinate vectors; systems of linear equations and their solution by reduction methods; matrix algebra; determinants; fundamentals of abstract vector spaces; linear independence, dimension theorems; linear transformations; eigenvalues and eigenvectors; diagonal matrices; quadratic forms; inner products; and the Gram-Schmidt orthogonalization.
Prerequisites:

Successful completion of MATH 310.

Typically Offered:
- On-Campus: Fall
- Online: Fall

MATH 344 Differential Equations 4.00
Introduction to the theory of ordinary differential equations including some coverage of series solutions, as time permits. Also covers various classical applications, such as spring mass systems.
Prerequisites:

Successful completion of MATH 241.

Typically Offered:
- On-campus: Select Semesters;

MATH 362 Topics In Geometry 3.00
A proof-based course in modern geometry with an emphasis on Euclidean Geometry. Topics include: lines, polygons, circles, congruence and similarity, area of shapes, compass and straight edge constructions, axioms of incidence, and Playfair's Axiom.
Prerequisites:

Successful completion of MATH 310.

Typically Offered:
- On-campus: Fall, Odd Years;

MATH 370 Probability 3.00
A first course in Calculus-based probability theory. Topics include: axioms of probability; combinatorial analysis; conditional probability; independence; discrete and continuous random variables; probability distributions; joint and marginal probability distributions; expectation; variance; Poisson processes; and limit theorems.
Prerequisites:

Successful completion of MATH 241 and MATH 310.

Typically Offered:
- On-campus: Fall, Odd Years;

MATH 371 Statistics 4.00
Calculus-based statistics emphasizing applications intended for students in mathematics, economics and the sciences. Topics include: the use of statistical software; estimation and prediction; hypothesis testing; linear and multiple regression; F and t tests; analysis of variance; and non-parametric statistics.
Prerequisites:

Successful completion of MATH 241 and MATH 310

Typically Offered:
- On-campus: Fall, Even Years;

MATH 381 Special Projects 1.00
Various individual and small-group projects carried out under the supervision of one or more instructors. Requires weekly progress reports plus a final report and/or a final exam. May be repeated, but no more than a total of four credits may be earned from both MATH 381 and CSCI 381. Pass-Fail only. Preliminary project plan and an independent study contract required prior to enrollment.
Typically Offered:
- On-campus: Select Semesters
- Online: Select Semesters

MATH 385 Introduction to Operations Research 3.00
Topics include mathematical programming, (programming problems, transportation problems, dynamic programming, game theory), queuing theory, inventory theory, reliability theory, and simulation techniques.
Prerequisites:

Successful completion of MATH 315 and MATH 370.

Typically Offered:
- On-campus: Select Semesters;

MATH 389 Mathematics Elective 1.00
Transfer credits ONLY from another accredited institution not equivalent to a UW-S course.

MATH 389MQ Transfer credits ONLY from another accredited institution not equivalent to a UW-S course. 1.00
Transfer credits ONLY from another accredited institution not equivalent to a UW-S course.
Core General Education Requirement:
- MQR - Mathematics & Quantitative Reasoning

MATH 390 Mathematical Sciences Internship 1.00
Work in an approved position to gain experience in solving real problems using computer science, mathematics, and statistics. Interns may receive salaried appointments with cooperating companies. Pass-Fail only.
Typically Offered:
- On-campus: Select Semesters
- Online: Select Semesters

MATH 391 Putnam Mathematical Competition 0.00
Preparation for the national Putnam Mathematics Contest. Includes review of previous examination problems and lectures on selected topics. May be repeated for a total of up to six credits. Pass-Fail only.
Typically Offered:
- On-Campus: Fall;

MATH 421 Theory of Computation 4.00
Thorough introduction to automata, formal languages and computability. Topics include: models of computation; regular and context-free languages; finite and pushdown automata; Turing machines; unsolvable decision problems; and fundamentals of computational complexity.
Prerequisites:

Successful completion of MATH 320.

Typically Offered:
- On-campus: Spring, Odd Years
- Online: Select Semesters

MATH 425 Algorithm Design and Analysis 4.00
Techniques for the design and analysis of algorithms, including greedy algorithms, divide-and-conquer, and dynamic programming graph and network algorithms (shortest paths, connectivity, coloring, flows, matchings), geometric algorithms (convex hulls, range search, nearest neighbors), NP-complexity and lower and upper bounds of program complexity, approximation algorithms (vertex cover, traveling salesman, scheduling), and introduction to randomized algorithms.
Prerequisites:

Successful completion of MATH 320.

Typically Offered:
- On-campus: Spring, Even Years
- Online: Spring, Even Years

MATH 440 Real Analysis 4.00
Fundamental concepts of limit, continuity, differentiability, and integrability of functions of one variable and sequences and series.
Prerequisites:

Successful completion of MATH 240 and MATH 310.

Typically Offered:
- On-campus: Spring, Odd Years;

MATH 450 Topology 4.00
Topology of Euclidean space, metric spaces, topological spaces, bases and neighborhoods, Hausdorff property, continuity, homeomorphisms and embeddings, connectivity, and compactness.
Prerequisites:

Successful completion of MATH 240 and MATH 310.

Typically Offered:
- On-campus: Fall, Even Years;

MATH 455 Abstract Algebra 4.00
Introduction to algebraic systems including groups, rings, integral domains and fields, homomorphisms and isomorphisms.
Prerequisites:

Successful completion of MATH 310.

Typically Offered:
- On-campus: Fall, Odd Years;

MATH 471 Introduction to Complex Variables 4.00
Introduction to the study of analytic functions including differentiation, integration and series.
Prerequisites:

Successful completion of MATH 240 and MATH 310.

Typically Offered:
- On-campus: Spring, Even Years;

MATH 475 Numerical Analysis 4.00
Study of theory and applications of computational techniques for mathematical solutions emphasizing rapid approximation and error analysis. Topics include: solution to equations in one variable; polynomial approximations to functions; error analysis; numerical solutions to ordinary differential equations; boundary value problems.
Prerequisites:

Successful completion of MATH 242 and MATH 310.

Typically Offered:
- On-campus: Select Semesters;

MATH 481 Special Topics 1.00
In-depth study of selected topics in mathematical sciences. May be repeated when topics are different.
Typically Offered:
- On-campus: Select Semesters;

MATH 489 Mathematics Elective 1.00
Transfer credits ONLY from another accredited institution not equivalent to a UW-S course.

MATH 489MC Math Elective Math/Computer Science 1.00
Transfer credits ONLY from another accredited institution not equivalent to a UW-S course.

MATH 498 Mathematics Capstone 1.00
Students work on a semester-length project in mathematics. Taken during senior year. A final paper and presentation are required.
Typically Offered:
- On-campus: Select Semesters
- Online: Select Semesters