MATH F051  Math Skills Review
1 Credit
Offered As Demand Warrants
Develops and reviews basic mathematical terminology, theory and operations as outlined by the Alaska State Mathematics Standards. Mathematics topics focus on reviewing the six basic 'strands' of mathematical content: numeration, measurement, estimation and computation, function and relationship, geometry, and statistics and probability. Approaches to problem solving will emphasize the process of mathematical thinking, communication and reasoning. It is an appropriate course for those preparing for the High School Qualifying Exam in Alaska or those needing a review of basic math skills in preparation for a math placement test at UAF. May be repeated for a total of three credits.
Lecture + Lab + Other: 1 + 0 + 0

MATH F053  SAT/ACT Math Prep and Review
1 Credit
Offered As Demand Warrants
This course will review basic concepts and practice math test taking skills to help prepare for the ACT and SAT tests.
Lecture + Lab + Other: 1 + 0 + 0

MATH F054  Prealgebra
3 Credits
Offered As Demand Warrants
Basic concepts of prealgebra mathematics. Topics include operations and applications of whole numbers, integers, fractions, decimals, ratios and proportions, percents, geometry and measures, evaluation of algebraic expressions and applications.
Prerequisites: DEVS F111 (may be taken concurrently); and appropriate placement scores.
Lecture + Lab + Other: 3 + 0 + 0

MATH F054A  Modularized Mastery Math: Prealgebra Module A
1 Credit
Offered As Demand Warrants
This course covers one credit of MATH F054 Prealgebra and includes the following topics: identifying and solving basic linear equations involving whole numbers, integers, decimals and fractions, solving ratio and proportion problems, solving percent problems, and solving applied problems. Topics are split into mini-modules and worked until mastery is achieved. Some mini-modules may be skipped if a student already demonstrates mastery of them. Computers will be used within a structured and independent learning setting.
Prerequisites: Appropriate placement test score within one calendar year; permission of instructor required.
Lecture + Lab + Other: 1 + 0 + 0

MATH F054B  Modularized Mastery Math: Prealgebra Module B
1 Credit
Offered As Demand Warrants
This course covers one credit of MATH F054 Prealgebra and includes the following topics: identifying and solving basic linear equations involving whole numbers, integers, decimals and fractions, solving ratio and proportion problems, solving percent problems, and solving applied problems. Topics are split into mini-modules and worked until mastery is achieved. Some mini-modules may be skipped if a student already demonstrates mastery of them. Computers will be used within a structured and independent learning setting.
Prerequisites: Grade of B or better in MATH F054A; or appropriate placement test scores taken within one calendar year; permission of instructor required.
Lecture + Lab + Other: 1 + 0 + 0

MATH F054C  Modularized Mastery Math: Prealgebra Module C
1 Credit
Offered As Demand Warrants
This course covers one credit of MATH F054 Prealgebra and includes the following topics: identifying and solving basic linear equations involving whole numbers, integers, decimals and fractions, solving ratio and proportion problems, solving percent problems, and solving applied problems. Topics are split into mini-modules and worked until mastery is achieved. Some mini-modules may be skipped if a student already demonstrates mastery of them. Computers will be used within a structured and independent learning setting. Prerequisite courses and/or placement exams must be taken within one calendar year.
Prerequisites: Grade of B or better in MATH F054A; or appropriate placement test scores; permission of instructor required.
Lecture + Lab + Other: 1 + 0 + 0

MATH F055  Elementary Algebra
3 Credits
Offered As Demand Warrants
Topics include evaluation and simplifying algebraic expressions, polynomials, factoring, integer exponents, rational expressions, solutions of linear equations and inequalities, quadratic equations and graphs of lines. Special fees apply. Prerequisite courses and/or placement exams must be taken within one calendar year prior to commencement of the course.
Prerequisites: DEVS F111 (may be taken concurrently); and grade of C or better in MATH F054B; or appropriate placement exam scores.
Lecture + Lab + Other: 3 + 0 + 0

MATH F054D  Modularized Mastery Math: Elementary Algebra Module D
1 Credit
Offered As Demand Warrants
This course covers one credit of the MATH F055 Elementary Algebra course and includes the following topics: simplifying algebraic expressions, solving linear equations in one variable, solving linear and compound inequalities in one variable, applications of linear equations and solving formulas. Topics are split into mini-modules and worked until mastery is achieved. Some mini-modules may be skipped if a student already demonstrates mastery of them. Computers will be used within a structured and independent learning setting.
Prerequisites: Grade of B or better in MATH F054, or ABUS F155; or appropriate placement test scores; permission of instructor required; prerequisite courses and/or placement exams must be taken within one calendar year.
Lecture + Lab + Other: 1 + 0 + 0
MATH F055E  Modularized Mastery Math: Elementary Algebra Module E
1 Credit
Offered As Demand Warrants
This course covers one credit of the MATH F055 Elementary Algebra course and includes the following topics: linear equations in two variables, graphing linear equations, find the slope of linear equations, writing equations of lines, exponent rules and operations on polynomials. Topics are split into mini-modules and worked until mastery is achieved. Some mini-modules may be skipped if a student already demonstrates mastery of them. Computers will be used within a structured and independent learning setting.
Prerequisites: Grade of B or better in MATH F055D taken within one calendar year; permission of instructor required.
Lecture + Lab + Other: 1 + 0 + 0

MATH F055F  Modularized Mastery Math: Elementary Algebra Module F
1 Credit
Offered As Demand Warrants
This course covers one credit of the MATH F055 Elementary Algebra course and includes the following topics: factoring polynomials, solving quadratic equations by factoring, simplifying rational expressions, operations with rational expressions, complex fractions, solving rational equations and applications of quadratic and rational equations. Topics are split into mini-modules and worked until mastery is achieved. Some mini-modules may be skipped if a student already demonstrates mastery of them. Computers will be used within a structured and independent learning setting.
Prerequisites: Grade of B or better in MATH F055E taken within one calendar year; permission of instructor required.
Lecture + Lab + Other: 1 + 0 + 0

MATH F056  Math Fast Track: Prealgebra/Elementary Algebra Review
1 Credit
Offered As Demand Warrants
A 20-hour intensive review of math concepts available prior to each semester. Covers prealgebra and elementary algebra topics to prepare qualified students to potentially improve their math course placement. Students should have a history of being successful in equivalent levels of math, although they may not recall enough information to place well on the placement test. Students who are successful in this class have the possibility of advancing through one or two semesters of developmental math.
Prerequisites: Placement into MATH F054 or MATH F055 or MATH F105N. Consists of instruction which may include lab instruction, individual student work or group work. May be repeated. Recommended for students who need more time and help to master the material in developmental math courses.
Lecture + Lab + Other: 1 - 3 + 0

MATH F062  Alternative Approaches to Math: Elementary Algebra
3 Credits
Offered As Demand Warrants
Algebraic topics. Includes operations with polynomial expressions, first- and second-degree equations, graphing, integral and relational exponents, and radicals using alternative teaching styles.
Prerequisites: Grade of C- or better in MATH F054; or ABUS F155; or appropriate placement test scores; prerequisite courses and/or placement exams must be taken within one calendar year prior to commencement of the course.
Lecture + Lab + Other: 3 + 0 + 0

MATH F065  Mathematics Skills
1-3 Credits
Offered As Demand Warrants
Course reviews material covered by MATH F105. Designed to assist students in reviewing and reinforcing course concepts covered by MATH F054, MATH F055, MATH F062, MATH F105 and MATH F105N. Consists of instruction which may include lab instruction, individual student work or group work. May be repeated. Recommended for students who need more time and help to master the material in developmental math courses.
Lecture + Lab + Other: 1 - 3 + 0

MATH F066  Advanced Math Fast Track: Elementary/Intermediate Algebra Review
1 Credit
Offered As Demand Warrants
A 20-hour intensive review of math concepts available prior to each semester. Covers elementary and intermediate algebra topics to prepare qualified students to potentially improve their math course placement. Students should have a history of being successful in equivalent levels of math, although they may not recall enough information to place well on the placement test. Students who are successful in this class have the possibility of advancing through one or two semesters of development math.
Prerequisites: Placement into MATH F055 or MATH F105 or MATH F105N.
Lecture + Lab + Other: 1 + 0 + 0

MATH F068  Math Essentials
4 Credits
Offered As Demand Warrants
Teaches the concepts of basic arithmetic and introductory algebra. Includes operations and properties on real numbers; ratios; proportion; percent; scientific notation; variation; topics from consumer mathematics; evaluation of literal expressions; solution and graphs of linear equations and inequalities; radicals and exponents; polynomials; factoring and special products; fundamental operations with algebraic fractions; solution of quadratic equations; and elementary systems of equations. Geometric formulae are presented on a case-to-case basis as needed. Student success strategies and college readiness skills are emphasized.
Prerequisites: Appropriate placement scores required.
Lecture + Lab + Other: 4 + 0 + 0

MATH F071  Review of Intermediate Algebra
1 Credit
Offered As Demand Warrants
Course reviews material covered by MATH F105. Individuals who have not taken an intermediate algebra course on the high-school level are recommended to enroll in MATH F105. Available via UAF eCampus only.
Lecture + Lab + Other: 1 + 0 + 0
MATH F105  Intermediate Algebra
3 Credits
Offered As Demand Warrants
This course covers one credit of the MATH Intermediate Algebra course and includes the following topics: solving quadratic equations, factoring, quadratic equations, polynomial equations and inequalities, and complex numbers. Topics are split into mini-modules and worked until mastery is achieved. Some mini-modules may be skipped if a student already demonstrates mastery of them. Computers will be used within a structured and independent learning setting. Prerequisite courses and/or placement exams must be taken within one calendar year. Prerequisites: A grade of B or better in MATH F105 or MATH F068, or appropriate placement test scores; permission of instructor required.
Lecture + Lab + Other: 1 + 0 + 0

MATH F105G  Modularized Mastery Math: Intermediate Algebra Module G
1 Credit
Offered As Demand Warrants
This course covers one credit of the MATH F105 Intermediate Algebra course and includes the following topics: solving quadratic equations, factoring, quadratic equations, polynomial equations and inequalities, and complex numbers. Topics are split into mini-modules and worked until mastery is achieved. Some mini-modules may be skipped if a student already demonstrates mastery of them. Computers will be used within a structured and independent learning setting. Prerequisite courses and/or placement exams must be taken within one calendar year. Prerequisites: A grade of B or better in MATH F105 or MATH F068, or appropriate placement test scores; permission of instructor required.
Lecture + Lab + Other: 1 + 0 + 0

MATH F105H  Modularized Mastery Math: Intermediate Algebra Module H
1 Credit
Offered As Demand Warrants
This course covers one credit of the MATH F105 Intermediate Algebra course and includes the following topics: solving quadratic equations, factoring, quadratic equations, polynomial equations and inequalities, and complex numbers. Topics are split into mini-modules and worked until mastery is achieved. Some mini-modules may be skipped if a student already demonstrates mastery of them. Computers will be used within a structured and independent learning setting. Prerequisite courses and/or placement exams must be taken within one calendar year. Prerequisites: A grade of B or better in MATH F105 or MATH F068, or appropriate placement test scores; permission of instructor required.
Lecture + Lab + Other: 1 + 0 + 0

MATH F105J  Modularized Mastery: Intermediate Algebra Module J
1 Credit
Offered As Demand Warrants
This course covers one credit of the MATH Intermediate Algebra course and includes the following topics: solving quadratic equations, polynomial equations and inequalities, and complex numbers. Topics are split into mini-modules and worked until mastery is achieved. Some mini-modules may be skipped if a student already demonstrates mastery of them. Computers will be used within a structured and independent learning setting. Prerequisites: A grade of B or better in MATH F105 or MATH F068, or appropriate placement test scores; permission of instructor required.
Lecture + Lab + Other: 1 + 0 + 0

MATH F105N  Intensive Intermediate Algebra
4 Credits
Offered As Demand Warrants
This course covers one credit of the MATH Intermediate Algebra course and includes the following topics: solving quadratic equations, factoring, quadratic equations, polynomial equations and inequalities, and complex numbers. Topics are split into mini-modules and worked until mastery is achieved. Some mini-modules may be skipped if a student already demonstrates mastery of them. Computers will be used within a structured and independent learning setting. Prerequisite courses and/or placement exams must be taken within one calendar year. Prerequisites: A grade of B or better in MATH F105 or MATH F068, or appropriate placement test scores; permission of instructor required.
Lecture + Lab + Other: 4 + 0 + 0

MATH F113X  Numbers and Society
3 Credits
Offered Fall and Spring
This course covers one credit of the MATH Intermediate Algebra course and includes the following topics: solving quadratic equations, factoring, quadratic equations, polynomial equations and inequalities, and complex numbers. Topics are split into mini-modules and worked until mastery is achieved. Some mini-modules may be skipped if a student already demonstrates mastery of them. Computers will be used within a structured and independent learning setting. Prerequisite courses and/or placement exams must be taken within one calendar year. Prerequisites: A grade of B or better in MATH F105 or MATH F068, or appropriate placement test scores; permission of instructor required.
Lecture + Lab + Other: 3 + 0 + 0

MATH F114X  Patterns and Society
3 Credits
Offered Fall and Spring
This course covers one credit of the MATH Intermediate Algebra course and includes the following topics: solving quadratic equations, factoring, quadratic equations, polynomial equations and inequalities, and complex numbers. Topics are split into mini-modules and worked until mastery is achieved. Some mini-modules may be skipped if a student already demonstrates mastery of them. Computers will be used within a structured and independent learning setting. Prerequisite courses and/or placement exams must be taken within one calendar year. Prerequisites: A grade of B or better in MATH F105 or MATH F068, or appropriate placement test scores; permission of instructor required.
Lecture + Lab + Other: 3 + 0 + 0
Mathematics (MATH)

MATH F122S  Essential Precalculus with Applications Skills Workshop
1 Credit
Offered Fall and Spring
Directed study of topics in MATH F122X; emphasis will be placed on problem solving and mathematical communication. Also included will be instruction on how to be successful in precalculus and mathematics-based courses.
Prerequisites: Previous W or grade below C- in MATH F122X; or placement into MATH F122X; or departmental recommendation.
Corequisite: MATH F122X.
Special Notes: Credit may be earned for taking MATH F122R or MATH F122S, but not for both.
Lecture + Lab + Other: 0.5 + 1.5 + 0

MATH F122X  Essential Precalculus with Applications (m)
3 Credits
Offered Fall and Spring
A study of various classes of functions, exploring their numeric, algebraic and graphical aspects. Function classes include linear, quadratic, rational, exponential and logarithmic. This course is appropriate for students in programs relating to business and economics or life sciences or students intending to take MATH F230X.
Prerequisites: Appropriate placement score, MATH F105, MATH F105N or MATH F105J.
Special Notes: Credit may be earned for MATH F151X or MATH F122X, but not for both.
Attributes: UAF GER Mathematics Req
Lecture + Lab + Other: 3 + 0 + 0

MATH F151S  College Algebra for Calculus Skills Workshop
1 Credit
Offered Fall and Spring
Directed study of topics in MATH F151X. Emphasis will be placed on problem-solving and mathematical communication. Also included will be instruction on how to be successful in College Algebra for Calculus and mathematics-based courses.
Prerequisites: Previous W or grade below C- in MATH F151X; or placement into MATH F151X; or departmental recommendation.
Corequisites: MATH F151X.
Special Notes: Credit may be earned for taking MATH F151R or MATH F151S, but not for both.
Lecture + Lab + Other: 0.5 + 1.5 + 0

MATH F151X  College Algebra for Calculus (m)
4 Credits
Offered Fall and Spring
Study of algebraic, logarithmic and exponential functions; systems of equations; applications.
Prerequisites: Appropriate score on the math placement test, B or better in MATH F105, B or better in MATH F105J or C or better in MATH F105N.
Special Notes: Credit may be earned for MATH F151X or MATH F122X, but not for both; Only eight credits total may be earned from MATH F151X, MATH F152X and MATH F156X.
Attributes: UAF GER Mathematics Req
Lecture + Lab + Other: 4.5 + 0 + 0

MATH F152X  Trigonometry (m)
3 Credits
Offered Fall and Spring
A study of trigonometric functions including graphing, identities, inverse trigonometric functions, solving equations and polar coordinates; applications.
Prerequisites: MATH F151X (may be taken concurrently) or placement.
Special Notes: Only eight credits total may be earned from MATH F151X, MATH F152X and MATH F156X.
Attributes: UAF GER Mathematics Req
Lecture + Lab + Other: 3 + 0 + 0

MATH F156S  Precalculus Skills Workshop
1 Credit
Offered Fall and Spring
Directed study of topics in precalculus. Emphasis will be placed on problem-solving and mathematical communication. Also included will be instruction on how to be successful in precalculus and mathematics-based courses.
Prerequisites: Previous W or grade below C- in MATH F156X; or placement into MATH F156X; or departmental recommendation.
Corequisites: MATH F156X.
Special Notes: Credit may be earned for taking MATH F156R or MATH F156S, but not for both.
Lecture + Lab + Other: 0.5 + 1.5 + 0

MATH F156X  Precalculus (m)
4 Credits
Offered Fall and Spring
Various classes of functions and their graphs are explored numerically, algebraically and graphically. Function classes include polynomial, rational, exponential, logarithmic and trigonometric. Skills and concepts needed for calculus are emphasized. This class is intended for students intending to take MATH F251X.
Prerequisites: Placement into MATH F156X.
Special Notes: Only eight credits total may be earned from MATH F151X, MATH F152X and MATH F156X.
Attributes: UAF GER Mathematics Req
Lecture + Lab + Other: 4 + 1 + 0

MATH F211  Mathematics for Elementary School Teachers (m)
3 Credits
Offered Fall
Elementary set theory, numeration systems, and algorithms of arithmetic, divisors, multiples, integers and introduction to rational numbers. Emphasis on classroom methods. Restricted to Elementary Education majors; others by permission of instructor.
Prerequisites: MATH F122X; or MATH F151X; or MATH F156X; or placement.
Lecture + Lab + Other: 3 + 1 + 0

MATH F212  Mathematics for Elementary School Teachers II (m)
3 Credits
Offered Spring
A continuation of MATH F211. Real number systems and subsystems, logic, informal geometry, metric system, probability and statistics. Emphasis on classroom methods.
Prerequisites: MATH F211.
Lecture + Lab + Other: 3 + 1 + 0
MATH F230S  Essential Calculus with Applications Skills Workshop
1 Credit
Offered Fall and Spring
Directed study of topics in MATH F230X; emphasis will be placed on problem-solving and mathematical communication. Also included will be instruction on how to be successful in calculus and other mathematics-based courses.
Prerequisites: Previous W or grade below C- in MATH F230X; or placement into MATH F230X; or departmental recommendation.
Corequisites: MATH F230X.
Special Notes: credit may be earned for taking MATH F230R or MATH F230S, but not for both.
Lecture + Lab + Other: 0.5 + 1.5 + 0

MATH F230X  Essential Calculus with Applications
3 Credits
Offered Fall and Spring
An introduction to the key ideas of differential and integral calculus, and their uses in business, economics and the life sciences. This course emphasizes a solid conceptual understanding, along with calculation techniques for basic applications. MATH F230X cannot serve as a prerequisite for MATH F252X.
Prerequisites: MATH F122X; or MATH F151X; or MATH F156X; or placement.
Special Notes: Credit cannot be earned for both MATH F230X and MATH F251X.
Attributes: UAF GER Mathematics Req
Lecture + Lab + Other: 3 + 0 + 0

MATH F251L  Calculus I Recitation
0 Credit
Offered Fall and Spring
Recitation section for Calculus I. Activities may include worksheets, quizzes and problem sessions associated with corresponding lecture material from MATH F251X.
Corequisites: MATH F251X.
Lecture + Lab + Other: 0 + 1 + 0

MATH F251S  Calculus I Skills Workshop
1 Credit
Offered Fall and Spring
Directed study of topics in MATH F251X, emphasis will be placed on problem-solving and mathematical communication. Also included will be instruction on how to be successful in Calculus I and mathematics-based courses.
Prerequisites: Previous W or grade below C- in MATH F251X; or placement into MATH F251X; or departmental recommendation.
Corequisites: MATH F251X.
Special Notes: Credit may be earned for taking MATH F251R or MATH F251S, but not for both.
Lecture + Lab + Other: 0.5 + 1.5 + 0

MATH F251X  Calculus I (m)
4 Credits
Offered Fall and Spring
A first course in single-variable calculus. Topics include limits; continuity and differentiation of functions; applications of the derivative to graphing, optimization, and rates of change; definite and indefinite integration; and the Fundamental Theorem of Calculus.
Prerequisites: Appropriate score on the math placement test; or MATH F151X and MATH F152X; or MATH F156X.
Corequisites: MATH F251L.
Special Notes: Credit may not be earned for both MATH F251X and MATH F230X.
Attributes: UAF GER Mathematics Req
Lecture + Lab + Other: 4 + 0 + 0

MATH F252X  Calculus II (m)
4 Credits
Offered Fall and Spring
Further topics in single-variable calculus, including techniques of integration; applications of integration; convergence of sequences and series; parameterized curves; and polar coordinates.
Prerequisites: MATH F251X.
Corequisites: MATH F252L.
Attributes: UAF GER Mathematics Req
Lecture + Lab + Other: 4 + 1 + 0

MATH F253X  Calculus III (m)
4 Credits
Offered Fall and Spring
Multivariable calculus. Topics include vectors in 2- and 3-dimensions; differential calculus of functions of several variables; multiple integration; vector calculus, including Green's and Stokes' Theorem; and applications.
Prerequisites: MATH F252X.
Attributes: UAF GER Mathematics Req
Lecture + Lab + Other: 4 + 0 + 0

MATH F265  Introduction to Mathematical Proofs (m)
3 Credits
Offered Spring
Emphasis on proof techniques with topics including logic, sets, cardinality, relations, functions, equivalence, induction, number theory, congruence classes and elementary counting. In addition, a rigorous treatment of topics from calculus or a selection of additional topics from discrete mathematics may be included.
Prerequisites: MATH F252X (may be taken concurrently).
Lecture + Lab + Other: 3 + 0 + 0

MATH F302  Differential Equations
3 Credits
Offered Fall and Spring
Nature and origin of differential equations, first order equations and solutions, linear differential equations with constant coefficients, systems of equations, power series solutions, operational methods, and applications.
Prerequisites: MATH F253X.
Lecture + Lab + Other: 3 + 0 + 0
MATH F305  Geometry
3 Credits
Offered Spring Even-numbered Years
Topics selected from such fields as Euclidean and non-Euclidean plane
gometry, affine geometry, projective geometry, and topology.
Prerequisites: MATH F265; MATH F314.
Recommended: MATH F253X.
Lecture + Lab + Other: 3 + 0 + 0

MATH F307  Discrete Mathematics
3 Credits
Offered Spring
Logic, counting, sets and functions, recurrence relations, graphs and
trees. Additional topics chosen from probability theory.
Prerequisites: MATH F265.
Lecture + Lab + Other: 3 + 0 + 0

MATH F310  Numerical Analysis
3 Credits
Offered Fall
Direct and iterative solutions of systems of equations, interpolation,
numerical differentiation and integration, numerical solutions of ordinary
differential equations, and error analysis.
Prerequisites: MATH F302 or MATH F314.
Lecture + Lab + Other: 3 + 0 + 0

MATH F314  Linear Algebra
3 Credits
Offered Fall and Spring
Linear equations, finite dimensional vector spaces, matrices,
determinants, linear transformations and characteristic values. Inner
product spaces.
Prerequisites: MATH F252X.
Lecture + Lab + Other: 3 + 0 + 0

MATH F316  Introduction to the History and Philosophy of
Mathematics
3 Credits
Offered Spring Odd-numbered Years
Important periods in the history of mathematics, including the
mathematics of Ancient Babylon, Mesopotamia, Greece, China and India;
mathematics of medieval Europe, the Middle East and the Renaissance;
the development of geometry, algebra and calculus. Other areas in the
development of mathematics and the philosophy of mathematics will be
studied as time permits. For students of mathematics, science, history
and philosophy.
Prerequisites: MATH F253X; MATH F265.
Lecture + Lab + Other: 3 + 0 + 0

MATH F320  Topics in Combinatorics
3 Credits
Offered Fall Odd-numbered Years
Introduction to some fundamental ideas of combinatorics. Topics
selected from such fields as enumerative combinatorics, generating
functions, set systems, recurrence relations, directed graphs, matchings,
Hamiltonian and Eulerian graphs, trees and graph colorings.
Prerequisites: MATH F265.
Lecture + Lab + Other: 3 + 0 + 0

MATH F321  Number Theory
3 Credits
Offered Fall Even-numbered Years
The theory of numbers is concerned with the properties of the integers,
one of the most basic of mathematical sets. Seemingly naive questions
of number theory stimulated much of the development of modern
mathematics and still provide rich opportunities for investigation.
Topics studied include classical ones such as primality, congruences,
monic reciprocity and Diophantine equations, as well as more recent
applications to cryptography. Additional topics such as continued
fractions, elliptical curves or an introduction to analytic methods may be
included.
Prerequisites: MATH F265.
Lecture + Lab + Other: 3 + 0 + 0

MATH F371  Probability
3 Credits
Offered Fall Odd-numbered Years
Probability spaces, conditional probability, random variables, continuous
and discrete distributions, expectation, moments, moment generating
functions and characteristic functions.
Prerequisites: MATH F253X.
Lecture + Lab + Other: 3 + 0 + 0

MATH F401  Introduction to Real Analysis (W)
3 Credits
Offered Fall
Completeness of the real numbers and its consequence, convergence of
sequences and series, limits and continuity, differentiation, the Riemann
integral.
Prerequisites: WRTG F111X; WRTG F211X, WRTG F212X, WRTG F213X or
WRTG F214X; MATH F253X; MATH F265.
Lecture + Lab + Other: 3 + 0 + 0

MATH F404  Introduction to Topology
3 Credits
Offered Fall Even-numbered Years
Introduction to topological spaces, set theory, open sets, compactness,
connectedness, product spaces, metric spaces and continua.
Prerequisites: MATH F253X; MATH F265.
Recommended: MATH F314 and/or MATH F405.
Lecture + Lab + Other: 3 + 0 + 0

MATH F405  Abstract Algebra (W)
3 Credits
Offered Spring
Theory of groups, rings and fields.
Prerequisites: WRTG F111X; WRTG F211X, WRTG F212X, WRTG F213X or
WRTG F214X; MATH F265.
Recommended: MATH F307 and/or MATH F314.
Lecture + Lab + Other: 3 + 0 + 0

MATH F408  Mathematical Statistics
3 Credits
Offered Spring Even-numbered Years
Distribution of random variables and functions of random variables,
interval estimation, point estimation, sufficient statistics, order statistics,
and test of hypotheses including various criteria for tests.
Prerequisites: MATH F371; STAT F200X or STAT F300.
Lecture + Lab + Other: 3 + 0 + 0
MATH F412  Differential Geometry  
3 Credits  
Offered Spring Odd-numbered Years  
Introduction to the differential geometry of curves, surfaces, and Riemannian manifolds. Basic concepts covered include the Frenet-Serret apparatus, surfaces, first and second fundamental forms, geodesics, Gauss curvature and the Gauss-Bonnet Theorem. Time permitting, topics such as minimal surfaces, theory of hypersurfaces and/or tensor analysis may be included.  
Prerequisites: MATH F314; MATH F401.  
Lecture + Lab + Other: 3 + 0 + 0  
MATH F421  Applied Analysis  
4 Credits  
Offered Fall  
Vector calculus, including gradient, divergence, and curl in orthogonal curvilinear coordinates, ordinary and partial differential equations and boundary value problems, and Fourier series and integrals.  
Prerequisites: MATH F302.  
Lecture + Lab + Other: 4 + 0 + 0  
MATH F422  Introduction to Complex Analysis  
3 Credits  
Offered Spring  
Complex functions including series, integrals, residues, conformal mapping and applications. May be taken independently of MATH F421.  
Prerequisites: MATH F302.  
Lecture + Lab + Other: 3 + 0 + 0  
MATH F430  Topics in Mathematics  
3 Credits  
Offered Spring  
An elective course in mathematics for majors. Topics will vary from year to year and may be drawn from mathematical biology, numerical linear algebra, graph theory, logic, or other areas of mathematics. May be repeated with permission of instructor for a total of nine credits.  
Prerequisites: MATH F265.  
Lecture + Lab + Other: 3 + 0 + 0  
MATH F460  Mathematical Modeling  
3 Credits  
Offered Fall Odd-numbered Years  
Introduction to mathematical modeling using differential or difference equations. Emphasis is on formulating models and interpreting qualitative behavior such models predict. Examples will be taken from a variety of fields, depending on the interest of the instructor. Students develop a modeling project.  
Prerequisites: COJO F131X or COJO F141X; WRTG F111X; WRTG F211X; WRTG F212X, WRTG F213X or WRTG F214X; MATH F252X.  
Recommended: one or more of MATH F302, MATH F310, MATH F314, MATH F401, STAT F300 or some programming experience.  
Lecture + Lab + Other: 3 + 0 + 0  
MATH F490  Senior Seminar  
2 Credits  
Offered Spring  
Advanced topics selected from areas outside the usual undergraduate offerings. A substantial level of mathematical maturity is assumed.  
Prerequisites: COJO F131X or COJO F141X; at least one of MATH F401 or MATH F405; senior standing.  
Lecture + Lab + Other: 2 + 0 + 0  
MATH F600  Teaching Seminar  
1 Credit  
Offered Fall  
Fundamentals of teaching mathematics in a university setting. Topics may include any aspect of teaching: university regulations, class and lecture organization, testing, book selection, teaching evaluations, etc. Specific topics will vary on the basis of student and instructor interest. Individual classroom visits will also be used for class discussion. May be repeated for credit.  
Prerequisites: Graduate standing.  
Lecture + Lab + Other: 1 + 0 + 0  
MATH F614  Numerical Linear Algebra  
3 Credits  
Offered Fall Odd-numbered Years  
Prerequisites: MATH F314.  
Recommended: MATH F421 or MATH F401.  
Lecture + Lab + Other: 3 + 0 + 0  
MATH F615  Numerical Analysis of Differential Equations  
3 Credits  
Offered Spring Odd-numbered Years  
Review of numerical differentiation and integration, and the numerical solution of ordinary differential equations. Main topics to include the numerical solution of partial differential equations, curve fitting, splines, and the approximation of functions. Supplementary topics such as the numerical method of lines, the fast Fourier transform, and finite elements may be included as time permits and interest warrants.  
Prerequisites: CS F201; MATH F310; MATH F314; MATH F421; MATH F422.  
Lecture + Lab + Other: 3 + 0 + 0  
MATH F617  Functional Analysis  
3 Credits  
Offered Spring Even-numbered Years  
Study of Banach and Hilbert spaces, and continuous linear maps between them. Linear functionals and the Hahn-Banach theorem. Applications of the Baire Category theorem. Compact operators, self adjoint operators, and their spectral properties. Weak topology and its applications.  
Prerequisites: MATH F314; MATH F401.  
Recommended: MATH F421; MATH F401.  
Lecture + Lab + Other: 3 + 0 + 0  
MATH F631  Algebra I  
4 Credits  
Offered Fall Even-numbered Years  
Rigorous development of groups, rings and fields.  
Prerequisites: MATH F405.  
Lecture + Lab + Other: 4 + 0 + 0  
MATH F632  Algebra II  
3 Credits  
Offered Spring Odd-numbered Years  
Advanced topics which may be chosen from group theory, Galois theory, commutative or non-commutative algebra, algebraic geometry, homological algebra or other areas.  
Prerequisites: MATH F631.  
Lecture + Lab + Other: 3 + 0 + 0
<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<th>Prerequisites</th>
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<td>MATH F641</td>
<td>Real Analysis</td>
<td>4</td>
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<td>MATH F651</td>
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<td>MATH F401 or MATH F404.</td>
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<td>MATH F658</td>
<td>Topics in Geometry</td>
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<td>Fall Even-numbered Years</td>
<td>Linear algebra; geometry; undergraduate real analysis; undergraduate abstract algebra.</td>
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<td>Advanced Mathematical Modeling</td>
<td>3</td>
<td>Spring Even-numbered Years</td>
<td>Permission of instructor.</td>
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<td>MATH F661</td>
<td>Optimization</td>
<td>3</td>
<td>Fall Even-numbered Years</td>
<td>Knowledge of calculus, linear algebra and computer programming.</td>
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<td>Graph Theory</td>
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<td>MATH F314; MATH F320.</td>
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<td>MATH F665</td>
<td>Topics in Graduate Mathematics</td>
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