

MATHEMATICS (MATH)

MATH 080 Introductory Algebra 3 Credit Hours

The Developmental Mathematics sequence (MATH 080, MATH 090) is offered as a service to students who need extra preparation in mathematics. MATH 080 is for students who are likely to need two semesters of additional preparation in mathematical computation and symbol manipulation, communication, and conceptual understanding. Topics in the two-course sequence include: arithmetic readiness, real numbers and expressions, linear equations and inequalities, lines and functions, systems of linear equations, rational expressions and equations, radicals and complex numbers, quadratic equations and functions, function operations and inverses. Students are required to have Internet-ready devices available for each class meeting. Skill development takes place online and outside scheduled class meetings. The course is graded on an A, B, C, NC (not completed) basis. This course is offered for additive credit.

Prerequisite(s): Mathematics Placement with a score of 080

MATH 090 Intermediate Algebra 3 or 6 Credit Hours

The Developmental Mathematics sequence (MATH 080, MATH 090) is offered as a service to students who need extra preparation in mathematics. MATH 090 is for students who (1) have successfully completed MATH 080 or (2) are likely to require only one semester of additional preparation in mathematical computation and symbol manipulation, communication, and conceptual understanding. Topics in the two-course sequence include: arithmetic readiness, real numbers and expressions, linear equations and inequalities, lines and functions, systems of linear equations, rational expressions and equations, radicals and complex numbers, quadratic equations and functions, function operations and inverses. Students are required to have Internet-ready devices available for each class meeting. Skill development takes place online and outside scheduled class meetings. The course is graded on an A, B, C, NC (not completed) basis. This course is offered for additive credit.

Prerequisite(s): MATH 080 or Mathematics Placement with a score of 090

MATH 104 College Algebra 4 Credit Hours

Primary purpose of this course is to prepare students for success in MATH 113. Topics include equations and inequalities, linear, quadratic, polynomial, rational, logarithmic and exponential functions along with their graphs; application of these functions, systems of linear inequalities. This course does not cover trigonometric functions and cannot be used as a prerequisite for MATH 115. Students electing this course should have at least taken two years of High School Algebra and one year of High School Geometry or MATH 090. Students cannot receive credit for both MATH 104 and MATH 105. (F, W, S)

Prerequisite(s): MATH 090 or Mathematics Placement with a score of 105

MATH 1045 Trigonometry 2 Credit Hours

The primary purpose of this course is to prepare students to take Math 115 (Calculus I) after successfully completing MATH 104 (College Algebra). It also meets students' demand to refresh or enhance their Trigonometry knowledge. Topics to be covered include: Trigonometric Functions, Acute Angles and Right Triangles, Radian Measure and the Unit Circle, Trigonometric identities, Inverse Circular Functions and basics of Functions. (YR)

Prerequisite(s): MATH 104

MATH 105 Pre-Calculus 4 Credit Hours

Primary purpose of this course is to prepare students for success in Calculus. Topics include equations and inequalities; linear, quadratic, polynomial, rational, logarithmic, exponential and trigonometric functions along with their graphs; application of these functions. Students electing this course should have taken at least two years of High School Algebra and one year of High School Geometry or MATH 090. Students cannot receive credit for both MATH 104 and MATH 105. (F,W,S)

Prerequisite(s): MATH 090 or Mathematics Placement with a score of 105

MATH 113 Calc I for Biology & Life Sci 4 Credit Hours

This course develops basic concepts of Calculus from the perspectives of Biology and Life Sciences. Topics include differential and integral calculus of algebraic/logarithmic/exponential functions of one variable, limits, continuity, differentiation, integration, graphing, optimization, related rates and area. Applications include modeling biological problems of medicine, genetics, Biomechanics, ecology, population growth and decay. (This course does not fulfill the calculus requirements for concentration in chemistry, physics, biochemistry, engineering, or mathematics) Student cannot receive credit for both Math 113 and Math 115.

Prerequisite(s): MATH 105 or MATH 104 or Mathematics Placement with a score of 115

MATH 114 Calc II for Biology & Life Sci 4 Credit Hours

The topics of this course include advanced methods of integration (integration by parts, partial fraction), modeling with differential equations, some elementary differential equations, matrix algebra, systems of linear equations using matrix method, introduction to probability, conditional probability, discrete and continuous random variables (exponential and normal random variables). Problems in biology, medicine and physiology are used to illustrate how computation and mathematics can improve and enhance the understanding of these problems. Students cannot receive credit for both Math 114 and Math 116.

Prerequisite(s): MATH 113 or MATH 115 or Mathematics Placement with a score of 116

MATH 115 Calculus I 4 Credit Hours

Calculus is the study of change and accumulation in continuously variable quantities. This course covers limits and continuity, derivatives and their applications, and integrals, with algebraic, exponential, and trigonometric functions and their inverses. Students cannot receive credit for both MATH 113 and MATH 115. (F, S, W).

Prerequisite(s): MATH 105 or (MATH 104 and MATH 1045) or Mathematics Placement with a score of 115

MATH 116 Calculus II 4 Credit Hours

This course continues the study of Calculus from Math 115, including applications and techniques of integration, improper integrals, parametric equations, polar coordinates, and sequences and series, including Taylor series. Students cannot receive credit for both MATH 114 and MATH 116. (F, S, W).

Prerequisite(s): MATH 115 or Mathematics Placement with a score of 116

MATH 131 Conceptual Mathematics 4 Credit Hours

The purpose of Math 131 is to develop an awareness of the use of mathematics in the world around us. Students are encouraged to understand organizational tools of mathematics, including set theory and the use of deductive logic. Areas of application may include: consumer Mathematics, Probability, Statistics, social decision making, apportionment, graph theory, and mathematical modeling. Students intending to elect this course should have taken the equivalent of one year of high school algebra and one year of high school geometry. This course is not open to mathematics concentrators. (F,W,S).

MATH 205 Calc III for Engin Students 3 Credit Hours

Vectors in the plane and space, topics from multivariable calculus including partial differentiation and multiple integration, with an emphasis on applications, and line integrals and Green's theorem. This course includes computer labs. Students cannot receive credit for both MATH 205 and MATH 215. (F,W,S).

Prerequisite(s): MATH 116 or Mathematics Placement with a score of 215

MATH 215 Calculus III 4 Credit Hours

Vectors in the plane and space, vector-valued functions and curves, functions of several variables including limits, continuity, partial differentiation and the chain rule, multiple integrals and coordinate transformations, integration in vector fields, and Green's and Stokes' theorems. This course includes computer labs. Students cannot receive credit for both MATH 205 and MATH 215. (F,W).

Prerequisite(s): MATH 116 or Mathematics Placement with a score of 215

MATH 227 Introduction to Linear Algebra 3 Credit Hours

An introduction to the theory and methods of linear algebra with matrices. Topics include: systems of linear equations, algebra of matrices, matrix factorizations, vector spaces, linear transformations, eigenvalues and eigenvectors, science and engineering applications, and computational methods. Students cannot receive credit for both MATH 227 and MATH 217. (F,W,S).

Prerequisite(s): MATH 116 or Mathematics Placement with a score of 215

MATH 228 Diff Eqns with Linear Algebra 4 Credit Hours

Full Title: Differential Equations with Linear Algebra This course provides an introduction to ordinary differential equations. Emphasis is placed on the development of abstract concepts and applications for first-order and linear higher-order differential equations, systems of differential equations, introductory numerical methods, matrix algebra, and Laplace transform techniques. It is recommended that students complete MATH 215 or MATH 205 before enrolling in this course. Students cannot receive credits for both MATH 228 and MATH 216 and MATH 217 (F, S, W).

Prerequisite(s): MATH 116

MATH 276 Discrete Math Meth Comptr Engr 4 Credit Hours

An introduction to fundamental concepts of discrete mathematics for computer engineering. Topics will be chosen from: set theory, partially ordered sets, lattices, Boolean algebra, semi-groups, rings, graphical representation of algebraic systems, graphs and directed graphs. Applications in various areas of computer engineering will be discussed. (F,W,S).

Prerequisite(s): MATH 116 or Mathematics Placement with a score of 215

MATH 300 Math Lang Proof & Struct 3 Credit Hours

A required course for students completing a Mathematics concentration, this course is also a prerequisite for many upper-level Mathematics courses. The course focuses on developing the following: an understanding of, and facility with, the logic and syntax of mathematical statements; and ability to recognize and propose appropriate strategies and outlines for proving given statements; facility in writing mathematical proofs; a knowledge base/toolbox of foundational material including basic concepts and terminology related to naïve set theory.

Prerequisite(s): MATH 217 or MATH 227

MATH 325 Probability 3 Credit Hours

Brief overview of summary and display of data, probability concepts, discrete and continuous random variables and associated probability models, expectation, independent random variables, probability generating functions and moment generating functions, sampling distributions, the central limit theorem, the t-distribution, properties of estimators, and interval estimation. Previously taught as Mathematical Statistics I. (F).

Prerequisite(s): MATH 114 or MATH 116

MATH 331 Survey of Geometry 3 Credit Hours

A development of Euclidean geometry as a formal axiom system and an introduction to non-Euclidean geometries and to Transformational Geometry. Geometric models and the history of geometry are stressed. Development of students' geometric intuition as well as their ability to work in a formal axiom system are emphasized. (F).

Prerequisite(s): MATH 116 and (MATH 200 or MATH 300)

MATH 335 Mathematical Interest Theory 3 Credit Hours

This course will cover introductory topics in the mathematical theory of interest with a focus on types of interest rates, annuities, bonds and loans. These topics will be studied deterministically by applying of a variety of finite and infinite sum formulae. Theoretical derivations of topics, including duration, portfolio immunization and interest rate swaps will be studied. Financial derivatives and stochastic methods will be introduced. Students cannot receive credit for both Math 335 and IMSE 421. (YR)

Prerequisite(s): MATH 116

MATH 385 Math for Elemen Teachers I 3 Credit Hours

The purpose of this course and the Math 386 and Math 387 courses is to provide future teachers with foundational knowledge of mathematics they will teach. An inquiry approach is emphasized involving problem solving, problem posing, pattern seeking, reasoning, justification, representations, and communications. Topics in Math 385 include numeration, meaning of operations, the reasoning behind procedures, and the rational number system, including fractions and decimals. (F,W)

Restriction(s):

Can enroll if College is Education, Health, and Human Services

MATH 386 Math for Elem Teachers II 3 Credit Hours

The purpose of this course and the Math 385 and Math 387 courses is to provide future teachers with foundational knowledge of mathematics they will teach. An inquiry approach is emphasized involving problem solving, problem posing, pattern seeking, reasoning, justification, representations, and communications. Topics in Math 386 include number theory, proportional reasoning, the geometry of two-dimensional shape and measurement, integers, and the real number system. (F,W)

Prerequisite(s): MATH 385

Restriction(s):

Can enroll if College is Education, Health, and Human Services

MATH 387 Math for Elem Teachers III 3 Credit Hours

The purpose of this course and the Math 385 and Math 386 courses is to provide future teachers with foundational knowledge of mathematics they will teach. An inquiry approach is emphasized involving problem solving, problem posing, pattern seeking, reasoning, justification, representations, and communications. Topics in Math 387 include data analysis; probability; the geometry of three-dimensions including shape, spatial visualization, and measurement; geometric concepts of similarity and congruence; coordinate geometry; and transformational geometry. Algebraic reasoning is integrated throughout. (FW)

Prerequisite(s): MATH 386

Restriction(s):

Can enroll if College is Education, Health, and Human Services

MATH 390 Topics in Mathematics 1 to 3 Credit Hours

A course designed to offer selected topics in different areas of mathematics. The specific topic or topics will be announced together with the prerequisites each term. Course may be repeated for credit when specific topics differ.

MATH 390E Topics in Mathematics 3 Credit Hours

TOPIC TITLE: Preparation for Industrial Careers PIC Math prepares mathematical science students for industrial careers by engaging them in research problems that come directly from industry. A strong component of PIC Math involves students working as a group on a semester-long undergraduate research problem from business, industry, or government. Undergraduate research is a high impact teaching and learning practice and has been shown to improve students abilities in Problem solving. Critical thinking, Independent thinking, and Communicating.

Prerequisite(s): MATH 200 or MATH 205 or MATH 215 or MATH 216 or MATH 217 or MATH 227 or MATH 276

MATH 391 Topics in Mathematics Edu 1 to 3 Credit Hours

A course designed to offer selected topics in mathematics related to K-12 education. The specific topic or topics will be announced together with the prerequisites each term. Course may be repeated for credit when specific topics differ. (OC).

MATH 391B Topics in Mathematics and Stat 1 to 3 Credit Hours

Topic: Number and Proportional Reasoning in Middle School Mathematics Teachers. This course is designed to deepen the teachers of middle school mathematics understanding of the rational number system and its extension to the real number system in a way that models appropriate pedagogy and raises curriculum issues relevant to teaching number concepts for conceptual understanding and computation fluency. A particular emphasis will be on understanding and applying concepts of proportional reasoning. Topics related to this emphasis include analyzing connections between fraction concepts and ratios and proportions; describing the relationship between proportions and direct and indirect variation; analyzing and applying the connections between proportions and similar figures, probability and sampling; and modeling and solving problems involving ratios and proportions. Other major topics include analyzing number theoretic concepts such as prime numbers and divisibility; and comparing and contrasting models of operations across number systems. Calculator and computer technology will be used as problem solving tools and for support in conceptual understanding. Curriculum resources and materials that support conceptual understanding are considered.

MATH 395 Elementary Number Theory 3 Credit Hours

Properties of the integers, the division algorithm, Euclid's algorithm, Fermat's theorems, unique factorization of integers into primes, congruences, arithmetic functions, Diophantine equations, continued fractions, quadratic reciprocity. (W).

Prerequisite(s): MATH 205 or MATH 215 or MATH 216 or MATH 217 or MATH 227 or MATH 228 or MATH 276

MATH 396 Introduction to Cryptography 3 Credit Hours

This course discusses ways of encrypting information, a function which is vital to economics, defense and the empowerment of society. It is more crucial now than ever before to be able to securely transfer information in this age of electronic communication. After discussing primitive ways of encrypting information and explaining the need for more sophisticated encoding methods, this course explores the mathematics (number theory, finite fields and probability) behind both historic and more recent cryptosystems that have been developed for the secure transmission of data along non secure channels. This course continues with symmetric and public key cryptosystems, elliptic curves, digital signatures, zero knowledge protocols and other more advanced methods. This course does not assume any prior knowledge of number theory or probability. (YR)

Prerequisite(s): MATH 205 or MATH 215 or MATH 216 or MATH 217 or MATH 227 or MATH 228 or MATH 276

MATH 399 Independent Studies in Math 1 to 3 Credit Hours

Independent study in mathematics for topics at the junior level. Topics and objectives chosen by agreement between student and instructor.

MATH 4000 Capstone in Mathematics 3 Credit Hours

Math 4000 is the Capstone course in Mathematics, covering an advanced topic in Mathematics determined by the instructor. Topics may include, but are not limited to, algebraic geometry, functional analysis, functions of several complex variables, and aspects of the study of numerical analysis, partial differential equations, combinatorics, probability, number theory, or topology. Students are expected to complete a research project in the area of the particular topic. (F, W)

Prerequisite(s): MATH 217 or MATH 227

Restriction(s):

Can enroll if Class is Junior or Senior

MATH 404 Dynamical Systems 3 Credit Hours

The aim of this course is to survey the standard types of differential equations. This includes systems of differential equations, and partial differential equations, including for each type, a discussion of the basic theory, examples of applications, and classical techniques of solutions with remarks about their numerical aspects. Also included are autonomous and periodic solutions, phase space, stability, perturbation techniques and Method of Liapunov. Students cannot receive credit for both MATH 404 and MATH 504. (AY).

Prerequisite(s): (MATH 216 or MATH 228) and (MATH 217 or MATH 227)

MATH 412 First Course in Modern Algebra 3 Credit Hours

Introduction to groups, subgroups, group homomorphisms, factor groups, simple groups, cyclic groups. Sylow theorems, rings, ideals, integral domains, fields, polynomial rings, Kronecker's theorem, also properties of the integer, rational, real, and complex numbers. Students cannot receive credit for both MATH 412 and MATH 512. (W).

Prerequisite(s): MATH 300 and MATH 227

MATH 413 Linear Algebra 3 Credit Hours

Vector spaces, linear transformations and matrices, determinants, inner product spaces, bilinear and quadratic forms, Hamilton-Cayley theorem, eigenvalues and eigenvectors, and spectral theorem. Students cannot receive credit for both MATH 413 and MATH 513. (F)

Prerequisite(s): MATH 300 and (MATH 217 or MATH 227)

MATH 420 Stochastic Processes 3 Credit Hours

Review of distribution theory. Introduction to stochastic processes, Markov chains and Markov processes, counting, and Poisson and Gaussian processes. Applications to queuing theory. Students cannot receive credit for both MATH 420 and MATH 520. (OC)

Prerequisite(s): MATH 325 or STAT 325 or IMSE 317

MATH 425 Mathematical Statistics 3 Credit Hours

Interval estimation and pivotal quantities, maximum likelihood estimation, hypothesis tests, linear models and analysis of variance, bivariate normal distribution, regression and correlation analysis, and nonparametric methods. Students cannot receive credit for both MATH 425 and MATH 525. Previously taught as Mathematical Statistics II. (AY,S)

Prerequisite(s): MATH 325

MATH 435 Mathematics of Finance 3 Credit Hours

Full Course Title: Introduction to Mathematics of Finance This course teaches students to apply mathematical skills in finance. Topics covered include different types of interests, cash flows, present and future values, yield, probability, annuities, debts, stocks and bonds. (YR)

Prerequisite(s): MATH 325

MATH 442 Geometry for Teachers 3 Credit Hours

Properties of two and three-dimensional figures are covered, including congruence, symmetry, transformation, and measurement. Trigonometry from a geometric perspective and the use of trigonometry in problem solving are included. Topics also include coordinate geometry and visualization as well as the nature of axiomatic reasoning and the role it has played in the development of mathematics. An investigative approach involving problem solving, reasoning and proof, connections, and communication will be emphasized. Calculator and computer technology will support the investigation of these topics. Classroom resources and materials are considered. Different levels of geometric thinking will be explored. No credit for CASL concentration, minor, or area of focus. Open only to certified teachers or elementary education students. Student cannot receive credit for both MATH 442 and MATH 542.

Prerequisite(s): MATH 387

Restriction(s):

Cannot enroll if Level is

Can enroll if College is Education, Health, and Human Services

MATH 443 Algebra for Teachers 3 Credit Hours

Algebraic structure is emphasized, especially as it relates to arithmetic. Emphasis is on the development of algebraic reasoning and generalizations with the appropriate pedagogy. Curriculum issues relevant to teaching algebra for conceptual understanding are included. Major topics include algebraic representations of linear, exponential, power and quadratic patterns, systems of equations, and applications. An investigative approach involving problem solving, reasoning and proof, connections and communications will be emphasized. Classroom resources and materials are considered as well as calculators and computer technology as problem-solving tools to aid in algebraic thinking. No credit for CASL concentration, minor or area of focus. Students cannot receive credit for both MATH 443 and MATH 543. (F, W, S).

Prerequisite(s): MATH 386

Restriction(s):

Cannot enroll if Level is

Can enroll if College is Education, Health, and Human Services

MATH 444 Data Anlsys, Prob&Stat for Tchrs 3 Credit Hours

Concepts of probability using both experimental and theoretical models are considered with an emphasis on the use of probability models to describe physical phenomena and to make and interpret predictions. Topics in data analysis and statistics include drawing inferences from visual displays of data, applying techniques of inferential statistics, sampling and simulations to generate solutions to problems, and making appropriate inferences using best fit techniques. Evaluating data and arguments to establish validity, interpreting, calculating and solving problems related to correlation, distributions, percentiles and standard scores are also included. An investigative approach involving problem solving, reasoning and proof, connections, and communication will be emphasized. Calculator and computer technology will support the investigation of these topics. No credit for CASL concentration, minor, or area of focus. Open only to certified teachers or elementary education students. Student cannot receive credit for both MATH 444 and MATH 544.

Prerequisite(s): MATH 387

Restriction(s):

Cannot enroll if Class is

Cannot enroll if Level is

Can enroll if College is Education, Health, and Human Services

MATH 445 Number & Prop'l Rsnng for Tchrs 3 Credit Hours

This course deepens previous work on rational number ideas and applications, and explores the concepts of ratio and proportion. Content includes a variety of situations involving proportions, for example, real-world problems involving ratios, rates, and percents, geometry involving similarity, algebra involving linearity, probability involving assigning a probability to an event, and trigonometry involving slope. Distinguishing proportional situations from those that are not and reasoning proportionally in appropriate situations are emphasized. The course includes problem solving, reasoning and proof, connections, communication, and multiple representations. No credit for CASL concentration, minor, or area of focus. Open only to certified teachers or elementary education students or by permission of instructor. Students cannot receive credit for both MATH 445 and MATH 545. (AY).

Prerequisite(s): MATH 442 and MATH 443

Restriction(s):

Cannot enroll if Class is

MATH 446 Discrete Math/Modeling for Tch 3 Credit Hours

This course interweaves the ideas of discrete mathematics with the approaches and strategies of mathematical modeling. It gives pre- and inservice teachers opportunities to deepen their understanding and use of mathematical models based on the concepts of discrete mathematics. Topics include recurrence, induction, permutations, combinations, binomial distributions, circuits, critical paths, minimal spanning trees, adjacency matrices, algorithm design and optimization. Systems thinking and multiple representations are emphasized. No credit for CASL concentration, minor, or area of focus. Open only to certified teachers or elementary education students. Students cannot receive credit for both MATH 446 and 546. (AY).

Prerequisite(s): MATH 442 and MATH 443

Restriction(s):

Cannot enroll if Class is

Cannot enroll if Level is

MATH 449 Concepts of Calc for Teachers 3 Credit Hours

Concepts of Calculus for Teachers focuses on calculus concepts appropriate for middle school mathematics teachers and teacher-candidates. The course provides a deep understanding of the major concepts of calculus: rates of change, accumulation (net change), area, and limits. Students will experience concrete approaches to the various topics using problem solving, manipulatives and technology as appropriate, with the intent being to help the learners discover how the ideas of calculus are useful in a variety of settings. Visual, numeric and commonsense approaches are used. No credit for CASL concentration, minor, or area of focus. Open only to certified teachers or elementary education students. Students cannot receive credit for both MATH 449 and 549. (AY)

Prerequisite(s): MATH 442 and MATH 443

Restriction(s):

Cannot enroll if Class is

MATH 451 Advanced Calculus I 3 Credit Hours

Properties of the real number system; point set theory for the real line including the Bolzano-Weierstrass theorem; sequences, functions of one variable: limits and continuity, differentiability, Riemann integrability. Students cannot receive credit for both MATH 451 and MATH 551. (F).

Prerequisite(s): MATH 300 and (MATH 216 or MATH 228) and (MATH 227 or MATH 217)

MATH 452 Advanced Calculus II 3 Credit Hours

Includes the rigorous study of functions of two and more variables, partial differentiation and multiple integration. Special topics include: Taylor Series, Implicit Function Theorem, Weierstrass Approximation Theorem, Arzela-Ascoli Theorem. Students cannot receive credit for both MATH 452 and MATH 552. (AY,W).

Prerequisite(s): MATH 451

MATH 454 Fourier and Boundary 3 Credit Hours

Fourier series and integrals. Their use in solving boundary value problems of mathematical physics by the method of separation of variables. Sturm-Liouville theory and generalized Fourier series, including those involving Bessel functions and Legendre polynomials, with applications. Students cannot receive credit for both MATH 454 and MATH 554. (F).

Prerequisite(s): (MATH 216 or MATH 228) and (MATH 205 or MATH 215)

MATH 455 Func of a Complex Var with App 3 Credit Hours

Complex number system. Functions of a complex variable, their derivatives and integrals. Taylor and Laurent series expansions. Residue theory and applications, elementary functions, conformal mapping, and applications to physical problems. Students cannot receive credit for both MATH 455 and MATH 555. (W).

Prerequisite(s): (MATH 216 or MATH 228) and (MATH 205 or MATH 215)

Restriction(s):

Can enroll if Level is Undergraduate

MATH 458 Introduction to Wavelets 3 Credit Hours

This course will introduce the students to theory and application of wavelets using linear algebra. Topics will include the discrete Fourier transform, the fast Fourier transform, linear transformations, orthogonal decomposition, discrete wavelet analysis, the filter bank, Haar Wavelet family, Daubechies's Wavelet family, and applications. Students cannot receive credit for both MATH 458 and MATH 558. (OC)

Prerequisite(s): MATH 217 or MATH 227

Restriction(s):

Can enroll if Class is Sophomore or Junior or Senior

MATH 462 Mathematical Modeling 3 Credit Hours

The processes of constructing, implementing, and evaluating mathematical models of "real world" phenomena are investigated. Models involving continuous and discrete mathematical constructs are considered. Deterministic and stochastic models are compared. Examples are taken from genetics, epidemiology, queuing theory, and other fields. Students cannot receive credit for both MATH 462 and MATH 562. (F).

Prerequisite(s): (MATH 216 or MATH 217 or MATH 228) and MATH 227

MATH 472 Intro to Numerical Analysis 3 Credit Hours

Solution of linear systems by Gaussian elimination, solution of non-linear equations by iterative methods, numerical solution of ordinary differential equations, data fitting with spline functions, numerical integration, optimization. Students cannot receive credit for both MATH 472 and MATH 572. (F).

Prerequisite(s): MATH 217 or MATH 227

MATH 473 Matrix Computation 3 Credit Hours

A study of the most effective methods for finding the numerical solution of problems which can be expressed in terms of matrices, including simultaneous linear equations, orthogonal projections and least squares, eigenvalues and eigenvectors, positive definite matrices, and difference and differential equations. Students cannot receive credit for both MATH 473 and MATH 573. (AY, W).

Prerequisite(s): MATH 217 or MATH 227

MATH 486 Sec School Math for Teachers 3 Credit Hours

Basic concepts, relationships, generalizations, and applications from the secondary school mathematics curriculum are discussed both from an advanced viewpoint and from the standpoint of the learner. Included are the roles of technology, problem solving, and current thinking on the teaching of secondary mathematics topics. Students cannot receive credit for both MATH 486 and MATH 586. (F).

Prerequisite(s): MATH 217 or MATH 227

MATH 492 Introduction to Topology 3 Credit Hours

Metric spaces, topological spaces, continuous maps, connectedness, compactness, separation axioms. Students cannot receive credit for both MATH 492 and MATH 592. Prior experience in a proof based course is recommended. (OC).

Prerequisite(s): MATH 300

MATH 499 Independent Studies in Math 1 to 3 Credit Hours

Independent study in mathematics for topics at the senior level. Topics and objectives chosen by agreement between student and instructor. (OC).

* An asterisk denotes that a course may be taken concurrently.

Frequency of Offering

The following abbreviations are used to denote the frequency of offering: (F) fall term; (W) winter term; (S) summer term; (F, W) fall and winter terms; (YR) once a year; (AY) alternating years; (OC) offered occasionally