Mathematics (MA)

Courses

MA 004 Beginning Algebra: 1 semester hour
This course is designed to provide remedial work for those students who enter college poorly prepared in mathematics. Class will focus on basic computational skills, dimensional analysis, irrational numbers, scientific notation, interpretation of graphs, basic geometric concepts, and an introduction to basic algebra. Emphasis will be on problem solving and reading for math.

MA 006 Intermediate Algebra II: 2 semester hours
The class covers the topics of intermediate algebra including inequalities, linear equations, systems of linear equations, quadratic equations, exponents, ratio, proportion, variation, and graphing. Returning students who have not been in a math class for a number of years might find this course a good choice in preparation for their statistics or core curriculum mathematics course. It offers a review of mathematics concepts. For students placed in the class, it is a prerequisite for their core curriculum class choice.

MA 120 Mathematics In Arts And Humanities: 3 semester hours
Many mathematicians see their field not as a science, but as close kin, at least in part, to both philosophy and the arts. This course will include readings and appropriate mathematics, especially geometry, to portray mathematics as part of the liberal arts. Mathematically, the courses will focus on problem solving skills while introducing the field in a way other than algebraic: What is calculus? Why is mathematics so abstract? What do we mean by the beauty of mathematics? What is the relationship between non-Euclidean geometry and the art of the Renaissance? These are the kinds of questions considered in this course. Prerequisite: Two years of high school algebra or MA 006.

MA 125 Fundamentals Of Arithmetic & Logic: 3 semester hours
This course will introduce some key concepts of mathematics: sets, logic, and numbers. We will use these to understand the Hindu Arabic numeration system, arithmetic, and measurement. In particular, we look at how numbers and operations correspond to reality and why our computational algorithms work. This course is designed to cover ideas of interest to the elementary education major; it does not prepare a student for the computational portion of the GRE. Elementary Education majors are given preference in enrolling in this course. Prerequisite: Two years of high school algebra or MA 006.

MA 130 Finite Mathematics: 3 semester hours
Finite mathematics will look briefly at a variety of topics, including systems of linear equations, matrices, linear programming, combinatorics, probability, sequences and series, and interest on money. Prerequisite: Two years of high school algebra or MA 006.

MA 132 Basic Mathematical Modeling: 3 semester hours
A mathematical model is a simplification of reality that is mathematically manageable. This course examines some specific models that are widely useful, but most of its focus is on choosing or creating a model, using the model to draw conclusions and refining a model when it is not sufficiently useful. Hence, mathematics is used to solve real life problems. Technology (e.g. Excel) will be used frequently. While algebra skills are needed, additional mathematics will be developed within the course; in particular, difference equations are necessary and logarithms are useful. Prerequisite: high school algebra 2 or MA 006 Intermediate Algebra, or departmental approval.

MA 135 Basic Statistics: 3 semester hours
This course is an introduction to the basics of probability as well as descriptive and inferential statistics. Topics include measures of central tendency, measure of dispersion, histograms, the normal and binomial distributions, hypothesis testing, confidence intervals, chi-square distribution, correlation, and prediction. Prerequisite: two years of high school algebra, MA 006, or departmental approval.

MA 139 Pre-Calculus: 4 semester hours
Pre-Calculus is a collection of topics necessary for the successful completion of a year of calculus. Basically, a good knowledge of pre-calculus is a comfortable familiarity with the idea of function and with most of the basic functions, including polynomials, rational functions, exponential, logarithmic and trigonometric functions. This comfortable familiarity allows one to solve equations and inequalities involving these various functions and to produce function rules from graphs or graphs from function rules. Prerequisite: three years of high school mathematics (including Algebra 2 and Geometry), an A- in MA 006, or the consent of the instructor.

MA 142 Mathematics Modeling: 3 semester hours
A mathematical model is a simplification of reality that is mathematically tractable. This course does examine some specific models that are widely useful, but most of its focus is on choosing or creating a model, using the model to draw conclusions and refining a model that is not sufficiently useful. It briefly reviews, and then uses, the tools learned in Pre-calculus: functions and graphs, logarithms, and trigonometry. Prerequisite: MA 132 or MA 139, or its equivalent in high school, or consent of the instructor.

MA 145 History of Mathematics for Elementary Education: 3 semester hours
This is a combination of the mathematics that elementary education majors have already seen with the history of mathematics. The goal is for elementary teachers to have a sense of what mathematics is and how the skills they will teach connect to modern mathematics. The course will include a study of the evolution of mathematics from ad hoc empirical techniques to the Greek notion of mathematics as a theoretical structure which gives certain knowledge about reality, which in turn yielded to modern mathematics - an abstract construct, possibly consistent, which does not of necessity illuminate reality. Prerequisite: At least 18 hours of the mathematics required for the original endorsement in elementary mathematics.

MA 150 Discrete Mathematics: 3 semester hours
The purpose of this course is to present various mathematical topics that are applicable to computer science. Topics to be covered include non-decimal numeration systems; prefix and postfix notation; the basic operations of sets, relations, and functions; induction and recursion; equivalence and congruence relations; propositional logic, truth tables, logical equivalence, and implications; Boolean algebra and switching theory; matrices and determinants; permutations and combinations; graph theory and directed graphs. Prerequisite: MA 139 or equivalent, or permission of instructor.

MA 160 Business Calculus: 3 semester hours

Business Calculus is a course treating standard one-variable calculus and its applications for business students, as well as selected other business applications, and an introduction to multivariable calculus. Calculus topics include the derivative, methods of finding derivatives, applications of derivatives, the integral, methods of integration, applications of integration, and the calculus of the exponential and logarithmic functions. Multivariable calculus topics include partial derivatives and finding local extrema. The course stresses applications in business and economics, and is intended to give business students the appropriate conceptual and computational mathematical background for future study in business.

MA 164 Calculus I: 4 semester hours

Introduction to Calculus I begins with a review of analytical geometry and basic functions. It then introduces limits, continuity, the derivative, and the antiderivative. Also included are the techniques of differentiation and applications of the derivative. Prerequisite: grade of C or better in MA 139 or equivalent course or permission of instructor.

MA 165 Calculus II: 4 semester hours

This course introduces the definite integral and its applications along with the techniques of integration. It also includes logarithmic and exponential functions, the trigonometric functions, and their universes. Prerequisite: grade of C or better in MA 164.

MA 166 Calculus III: 3 semester hours

Calculus III includes the more advanced topics of basic calculus. Included are polar coordinates, approximate integrations, indeterminate forms and improper integrals, solid analytic geometry, infinite series and functions of several variables. Prerequisite: grade of C or better in MA 165.

MA 202 Linear Algebra: 4 semester hours

This course introduces the basic topics and techniques of linear algebra. Topics include linear systems, matrices, determinants, general vector spaces, subspaces, basic and dimension, inner product spaces, orthonormal bases, changing bases, linear transformations and their properties, eigenvalues, eigenvectors, diagonalization. Students will gain mathematical maturity in writing proofs. Prerequisite: MA 164.

MA 210 Introduction To Graph Theory: 3 semester hours

This course introduces concepts of graph theory and some of the most interesting and important theoretical results in the field. Concepts discussed include directed and undirected graphs, trees and general graphs, planarity in graphs, graph colorings, network flow and connectivity, matching and independent sets, and graph algorithms and applications. Prerequisite: MA 150.

MA 214 Probability And Statistics: 3 semester hours

The basic concepts of probability theory and mathematical statistics will be examined. Topics to be discussed include probability spaces, random variables, multivariate distributions, expectation, random sampling, central limit theorem, and confidence intervals. Prerequisite: MA 165 and MA 150 or MA 202.

MA 245 Differential Equations: 3 semester hours

Methods of solution for the first-order as well as higher order differential equations will be discussed. Other topics to be covered include problems in mechanics, rate problems, series solutions, and systems of linear differential equations. Corequisite: MA 166.

MA 266 Introduction To Numerical Methods: 3 semester hours

The purpose of this course is to introduce the numerical techniques used in the solution of mathematical problems. Topics include interpolation, non-linear equations, systems of linear equations, error analysis and norms, matrix inversion, differentiation, integration, and curve fitting. Prerequisite: MA 165.

MA 323 Foundations Of Modern Geometry: 3 semester hours

This course aims at showing the student the need for a rigorous, abstract, deductive treatment of geometry. It includes a study of geometry developed without using a parallel postulate and goes on to show how separate geometrics evolve when different parallel postulates are added, in turn, to common body definitions, axioms, and theorems. Prerequisites: Grade of C or better in MA 202.

MA 364 Modern Algebra: 3 semester hours

Modern algebra introduces the student tot groups, rings, integral domains, and fields using as examples the ring of integers and the fields of rational, real, and complex numbers. Also included are isomorphisms and homomorphism. Prerequisite: grade of C or better in MA 202.

MA 374 Analysis I: 3 semester hours

Analysis develops the theoretical underpinnings of calculus. The key idea is a precise definition of limit, one which never used the words "infinitely close" or infinitely small." Using this fundamental definition, we revisit the ideas of calculus: continuity, the derivative and the integral. In addition, we consider sequences and the topology of the real numbers. Prerequisite: grade of C or better in MA 202.

MA 380 History Of Mathematics: 3 semester hours

This course will give an account of how mathematics, one of the oldest of all intellectual instruments, has developed over the past 5000 years. The content will be basically chronological, beginning with the origins of mathematics in the great civilizations of antiquity and progressing through the first few decades of this century. The emphasis will be on mathematics-how its various branches like geometry, trigonometry, algebra, and calculus developed and became interwoven and how famous mathematicians including Pythagoras, Euclid, Fibonacci, Descartes, Newton, Leibniz, Pascal, and Gauss contributed to the development. Prerequisite: senior standing and at least 27 semester hours of math major credit or 14 semester hours of math minor credit.

MA 399 Special Topics: Mathematics: 3 semester hours

This course gives students the opportunity to take electives in areas of special interest to them since the topic covered varies from one semester to the next. Topics selected from both pure and applied mathematics such as real analysis, complex analysis, number theory, set theory, optimization theory, graph theory, coding theory, fractals, and operations research will be taught. This course may be taken more than once provided a different topic is being taken each time. Prerequisite MA 166 and MA 202 or permission of the instructor. (Offered every year).

MA 425 Internship in Mathematics: 3 semester hours

Special opportunities may be available with area businesses for an internship involving topics in mathematics. These internships include off-campus supervision at the business and periodic meetings with the on-campus instructor who will also determine any additional requirements on an individual basis. (Maximum of one semester credit for each forty hours worked at the business, up to a maximum of 6 semester hours, a maximum of 3 of which can count for a mathematics major elective.).

MA 445 Independent Study: 3 semester hours
Study topics will be negotiated by the student and his/ her advisor.