

MAT-Mathematics

MAT100 - Survey of Mathematics

This course was designed to enhance the student's knowledge, understanding and appreciation of mathematics. Topics are selected from among a variety of areas and fields in mathematics: problem solving, set theory, logic, numeration systems, elementary number theory, statistics, geometry and probability. The student will examine the language, notation and applications relative to each area in mathematics.

MAT110 - Applications of Math

This mathematics course will cover how to apply mathematics to real world situations such as determining methods of fair voting and apportionment, finding the shortest path, scheduling meetings, determining the best return on investments, and collecting data to show patterns.

MAT120 - Elementary Topics in Mathematics I

This is the first course of a sequence of two mathematics content courses specifically designed for Pre-K to grade 8 teacher education candidates by providing an overview of fundamental mathematical concepts. The content covered includes basic algebraic work with equations and inequalities in one unknown, systems of equations, problem-solving, sets, concepts of logic, binary operations, systems of numeration, number theory, rational numbers, real numbers, measurement, and use of calculators and computers.

MAT130 - Elementary Topics in Mathematics II

This is the second course of a sequence of two mathematics content courses specifically designed for Pre-K to Grade 8 teacher education candidates by providing an overview of fundamental mathematical concepts. The content covered includes metric and non-metric geometry, coordinate geometry, introduction of statistics and probability, problem solving, and computer use.

MAT181 - College Algebra

Fundamental operations; factoring and algebraic fractions; exponents and radicals; functions and graphs; equations and inequalities; properties of graphs; systems of linear equations; synthetic division; rational zeros of polynomials; and logarithmic and exponential functions.

MAT191 - College Trigonometry

A thorough development of trigonometry. This course includes both circular and right-triangle geometry, evaluation of trigonometric functions, graphing trigonometric and inverse trigonometric functions, analyses of trigonometric graphs, verifying trigonometric identities, solutions of trigonometric equations, and applications of trigonometry.

MAT195 - Discrete Mathematical Structures for Computer Science

An introduction to the theories and structures of mathematics that are relevant in computer science. Topics include: set theory, formal logic, mathematical induction, Boolean algebra, number theory, matrix algebra, combinatorics, probability, algorithmic analysis, complexity, and graph theory.

MAT199 - Precalculus

This course is a study of numerical, analytical, and graphical properties of functions. The course content includes polynomial, rational, irrational, exponential, logarithmic, and trigonometric functions. This course is designed as a preparation for calculus..

MAT205 - Statistics for the Health & Social Sciences

For health and Social science majors only; not counted toward a mathematics major. This course is intended to provide just-in-time algebra reviews necessary to complete statistical analysis for various health and social sciences related problems. The following topics will be covered: frequency distribution, percentiles, measures of central tendency and variability, normal distribution and curve, populations, samples, sampling distribution of means, sampling distributions of proportion, null and alternative hypotheses, type I and type II errors, tests of means, confidence intervals, decision procedures, correlation, chi-square, simple analysis of variance, and design of experiments.

MAT207 - Data Preparation and Cleaning

This course provides students with an introduction to the need for and methods for data cleaning. The course presents methods for locating and handling invalid values, out-of-range values, and missing values along with methods for managing datasets. The course uses SAS software.

MAT213 - Data Visualization

This course explores techniques and tools for creating effective data visualizations. The course covers the creation and exploration of visualizations for categorical data, time series data, spatial and geospatial data. SAS software will be used for this course.

MAT215 - Statistics

For non-mathematics majors; not counted toward a mathematics major. Frequency distribution, percentiles, measures of central tendency and variability, normal distribution and curve, populations, samples, sampling distribution of means, sampling distributions of proportion, null and alternative hypotheses, type I and type II errors, tests of means, confidence intervals, decision procedures, correlation, chi-square, simple analysis of variance, and design of experiments.

MAT225 - Business Statistics

Statistical techniques relevant to business applications. Primary emphasis is placed upon identification of appropriate statistical methods to use, proper interpretation and appropriate presentation of results. Topics include descriptive statistics, probability concepts, the normal probability distribution, estimation techniques, tests of hypotheses, simple and multiple linear regression. Statistical software is used to implement many of the statistical methods.

MAT251 - Big Data Tools

This course covers an introduction to big data analysis tools. The course provides an overview of SAS, Hadoop and other big data tools. The course covers the structure and framework of data analytic tools and covers the use of these tools to perform various analyses.

MAT261 - Big Data Analytics

This course is intended to provide the student with an introduction to big data, big data analytics and several methods useful in big data analytics such as clustering, association rules and various forms of regression. SAS® statistical software will also be introduced and used to solve data problems.

MAT272 - Discrete Mathematics

Introduction to theories and methods of mathematics relative to computer science but taught from a mathematics perspective. Topics include logic, set theory, elementary number theory, methods of proofs and proof writing (direct, indirect and math induction), combinatorics, probability, relations and functions, and graph theory.

MAT273 - Applied Calculus

The techniques of differentiation and integration are covered without the theory of limits and continuity.

Applications in business and biological science are considered.

MAT281 - Calculus I

A study of modeling, functions, limits and continuity; the derivative; application of the derivative.

MAT282 - Calculus II

The integral; fundamental theorem of calculus; applications of the integral; inverse functions; logarithmic functions; hyperbolic functions; techniques of integration.

MAT290 - Technology for Mathematics

This course, designed for both mathematics and science majors, and for prospective and practicing educators, details the use of technological tools in the study of mathematics and explores the effective and appropriate use of technology in the teaching, learning, and application of mathematics. The course is composed of three components: using graphing calculators; using calculator-based laboratories; and using mathematical software. The course will be taught from a laboratory-based perspective.

MAT303 - Geometry

Analysis of axiomatic systems, axiomatic development of elementary Euclidean geometry and non-Euclidean geometry.

MAT304 - History of Mathematics

This course is a historical summary of the development of mathematics. Emphasis is placed on relating mathematics to the development of world culture and its relationship with all aspects of our culture. The lives and discoveries of many mathematicians are discussed. Methods of incorporating the history of mathematics into high school mathematics courses are a major focus of the course.

MAT305 - Theory of Equations

This course deals with the development of the theory involved in solving algebraic equations. It includes complex numbers as an algebraic system, polynomials in one variable, cubic and biquadratic equations, limits of roots and rational roots, isolation and separation of roots, and the approximate evaluations of roots.

MAT341 - Linear Algebra I

This course covers systems of linear equations and matrices, determinants, vectors in n -space, vector spaces, linear transformations, eigenvalues, eigenvectors, and applications.

MAT345 - Cryptography I

This course is intended to provide an introduction to cryptography with the number theory portion tied in. The following topics will be covered: modular arithmetic, classical cryptography, public key cryptography and introduction to complexity.

MAT351 - Abstract Algebra I

Fundamental concepts of logic; natural numbers, well-ordering property, induction, elementary concepts of number theory; groups, cosets, Lagrange's theorem, normal subgroups, factor groups; homomorphism,

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isomorphism and related topics including Cayley's theorem, natural homomorphism, and the three fundamental homomorphism theorems.

MAT353 - Intermediate Mathematical Statistics

This course provides an introduction to mathematical statistics. It re-introduces content from an introductory statistics course and develops the content in theory further. It adds an in-depth look at several statistical methods from introductory courses and introduces Bayes estimation and testing.

MAT361 - Nonparametric Statistics

This course provides an introduction to nonparametric statistics. It includes the introduction of nonparametric inference testing including the Wilcoxon Test, the Mann-Whitney test, the Ansari-Bradley test, the Kruskal-Wallis test, the Kendall test and the Theil test along with their associated estimators. Students will also learn how to run analyses in the SAS® software program.

MAT371 - Applied Categorical Data Analysis

This course provides an introduction to categorical data analysis. Topics include contingency table analysis, inference for contingency tables, models for binary response data including logistic regression and probit models, models for multinomial responses, loglinear models and mixture models for discrete data. SAS® software will be used for analysis.

MAT373 - Applied Time Series

This course provides an introduction to time series analysis. The course covers models for stationary and nonstationary time series including model selection, diagnostics and forecasting. This course uses SAS® software for analysis.

MAT376 - Applied Regression

This course is an introductory level course in regression analysis. This course begins with simple linear regression and associated one-way analysis of variance tables for regression analysis along with diagnostic measures for simple linear regression. The course continues with more complicated regression models including general regression models, multiple regression, generalized linear models and a brief introduction to nonlinear estimation. The course will cover the necessary linear algebra for completing regression. SAS® software will be used to complete analysis.

MAT381 - Calculus III

Continuation of integration techniques, indeterminate forms and improper integrals, parametric and polar curves, and conic sections, infinite series, and the theory of infinite series and power series.

MAT382 - Calculus IV

Vector analysis in two and three dimensions. Topics include theory of curves and surfaces; partial derivatives; multiple integrals; and Greens, Stokes and the Divergence theorems.

MAT391 - Statistical Packages

This course provides an in-depth look at statistical packages used to complete a variety of statistical analysis. The course will focus on current and highly used packages such as SAS®, Hadoop, and R. The course will provide a basic introduction to each package and will also cover more in-depth topics within each package as applicable.

MAT400 - Mathematical Modeling

This course provides an introduction to mathematical modeling. Students will be presented with real-world problems from a variety of fields, such as physics, biology, earth science, meteorology, engineering, economics,

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etc. Students will learn how to select appropriate mathematical models to model the real-world situation, use the model to solve a real-world problem, interpret the results of the solution(s), and communicate their work orally and in written format.

MAT401 - Data Analysis Capstone Project

This course is designed for the certificate in Data Science to provide hands-on experience in the area of data science. This experience will enable students to apply their knowledge of data science and provide valuable experience in the application of methods studied within the program that should enhance their job opportunities upon graduation. Students will receive experience with real world data. Analysis will be completed using SAS®.

MAT406 - Differential Equations

Ordinary differential equations and their solutions. The existence and uniqueness of solutions. Various types of differential equations and the techniques for obtaining their solution. Some basic applications, including numerical techniques, computer solution techniques are discussed.

MAT419 - Math Internship

This course is designed for the BA in Mathematics majors who are seeking work experience in the Mathematics area. This intern experience will enable students to apply their knowledge of Mathematics in the real workplace. The internship will provide students with the valuable experience in the applications of Mathematics that should enhance their job opportunities upon graduation.

MAT441 - Linear Algebra II

Extends the concepts learned in Linear Algebra I. The content is not fixed, but usually includes the following topics: linear transformations, change-of-base matrices, representation matrices; inner-product spaces, eigenvalues and eigenvectors, diagonalization.

MAT451 - Abstract Algebra II

This course is a continuation of MAT 351 Abstract Algebra I. It continues the covering of algebraic structures such as fields, rings and groups. It is a blend of theory and application.

MAT461 - Statistical Analysis I

Basic concepts of both discrete and continuous probability theory. The concepts of a random variable is stressed, including distributions and mathematical expectation. A number of important probability models are studied in detail. Analyses will be performed using SAS® software.

MAT462 - Statistical Analysis II

Statistical theory and application of statistical estimation techniques and hypothesis and hypothesis testing methods. Simple linear regression, multiple linear regression and basic experimental design. Analyses will be performed using SAS® software.

MAT471 - Applied Multivariate Statistics

This course covers the basics for several multivariate statistical analyses. The course covers principal component analysis, canonical correlation analysis, factor analysis, discriminant analysis, and cluster analysis. SAS® software will be used for all analyses.

MAT474 - Complex Analysis

The course introduces the essential concepts in the Complex Analysis such as: Complex Numbers, Functions of complex variables, their Limits, Continuity, Derivatives, Integrals and Cauchy Integral Formula. 2. Shows students the importance of Complex Analysis Theory in pure mathematics, applied mathematics and Engineering Applications. 3. Develops the elements of Complex-Variable Functions in a rigorous and self contained manner.

MAT481 - Real Analysis I

This course covers logic and techniques of proof; relations, functions, cardinality and naive set theory; development of real numbers from natural numbers through topology of the line; and convergence and related ideas dealing with functions (sequences and series), including continuity.

MAT491 - Statistical Packages II

This course continues to consider statistical packages to complete statistical analysis and big data analysis. The course will focus on current and highly used packages. This course will provide an in-depth look at each package and give students hands-on experience with installing, working in and producing analysis using current software.

MAT496 - Senior Research Project

This course, which should be taken near the end of the student's bachelor's degree program, involves an in-depth investigation of a mathematical or computer science topic (theoretical computer science being mathematical in nature). The investigation will culminate in the presentation of a senior paper.