

(MS) MATHEMATICS

Courses

MS 113. Principles of College Algebra. 3 Hours.

This course relates college algebra to everyday life. It starts with number systems, exponents and scientific notation, radicals, polynomials, and factoring. The course continues with equations including coordinate systems, linear equations of one variable, and modeling using linear equations. It finishes with quadratic equations and their real-world applications. Functions and fundamental concepts include domain, range, rates of change, graphs, composition of functions, transformations of functions, and finally inverse functions. The course concludes with a deeper dive into linear, quadratic, exponential, and logarithmic functions.

MS 115. Quantitative Literacy. 3 Hours.

Quantitative Literacy provides a college level experience that focuses on the process of interpreting and reasoning with quantitative information. Students are expected to build on prior understanding of mathematical models and applications, while integrating concepts from logic, algebra, geometry, probability and statistics. Understanding the language of mathematics, developing strategies and interpreting results, are learned via a context driven approach requiring a willingness to think about quantitative issues in new ways. A prerequisite of a C or better of MS 093 or equivalent by the Initial Math Assessment is required.

MS 125. Finite Mathematics. 3 Hours.

This course covers the algebraic development of linear and nonlinear equations and inequalities. Topics also include math of finance, analytic geometry, linear systems of equations and inequalities, matrix theory, and linear programming. This course is designed as a continuation for those students who have taken MS 141. Prerequisite(s): MS 141 or MS 180 or MS 181 or MS 182.

MS 131. Logic and Problem Solving. 3 Hours.

This course is designed to develop logical thought processes and to lead to critical forms of reading and thinking. Topics include statement forms and types of statement connectives. Techniques of problem solving are taught.

MS 132. Probability and Statistics. 3 Hours.

This course is an introduction to the theory and application of probability and statistical analysis. Both descriptive and inferential techniques will be studied, with emphasis placed on statistical sampling and hypothesis testing. Also considered will be linear regression, contingency table analysis, and decision-making under uncertainty. A prerequisite of MS 141 or higher or equivalent by the Initial Math Assessment is required. Prerequisite(s): MS 141 or MS 180 or MS 181 or MS 182.

MS 141. Contemporary College Algebra. 4 Hours.

Contemporary College Algebra provides students a college level academic experience that emphasizes the use of algebra and functions in problem solving and modeling, provides a foundation in quantitative literacy, supplies the algebra and other mathematics needed in partner disciplines, and helps meet quantitative needs in, and outside of, academia. Students address problems presented as real world situations by creating and interpreting mathematical models. Solutions to the problems are formulated, validated, and analyzed using mental, paper and pencil, algebraic, and technology-based techniques as appropriate. Four credit hours. A prerequisite of a C or better of MS 093 or equivalent by the Initial Math Assessment is required.

MS 150. History of Mathematics. 3 Hours.

This course introduces students to the development of mathematics from ancient to modern times, with emphasis on methods and techniques of particular times and cultures. The course also explores the connections between mathematics and other types of academic or artistic thought of a specific period, as well as the influence of mathematics on various societies. Prerequisite(s): MS 141 or MS 180 or MS 181 or MS 182.

MS 160. Mathematics for Elementary Teachers. 3 Hours.

Mathematics for Elementary Teachers focuses on the building blocks of mathematics while integrating the Common Core Practice Standards. Students are expected to build upon prior mathematical understanding, as they learn new ways to demonstrate understanding of fluency in mathematics and the different algorithms used to teach a conceptual understanding of mathematics to elementary school students. It is of particular importance that teachers of mathematics are able to translate between multiple algorithms and varying perspectives on the same questions in mathematics. Among other topics, students will explore sets, place value, mental math, estimation, fractions, geometry, logic and basic computation. Prerequisite(s): MS 132.

MS 180. Precalculus with Trigonometry. 4 Hours.

This course is intended to prepare students for MS 181 Calculus with Applications as well as providing instruction in trigonometry to support subsequent studies in physics, chemistry, and mathematics. Emphasis is on the analysis of elementary functions and modeling, including polynomial and rational functions, exponential and logarithmic functions, and trigonometric functions. Topics in analytic trigonometry and analytic geometry are also included. Four credit hours. A prerequisite of MS 141 or equivalent by the Initial Math Assessment is required. Prerequisite(s): MS 141.

MS 181. Calculus with Applications. 4 Hours.

This course provides an introduction to single variable calculus and its application. Emphasis is on conceptual understanding of the major ideas of calculus including limits as models of approximation, derivatives as models of change, and integrals as models of accumulation. Concepts are explored by combining, comparing and moving among graphical, numerical, and algebraic representations. This course is a four credit hour course. A prerequisite of MS 180 or equivalent by the Initial Math Assessment is required. Prerequisite(s): MS 180.

MS 182. Calculus II. 4 Hours.

This course is a continuation of MS181 Calculus with Applications. It prepares students for subsequent studies in mathematics, science, and business. Students engage with concepts and applications of numerical integration, applications of integration, antidifferentiation, function approximation, improper integrals, and infinite series. Emphasis is placed on concepts, complementing symbolic with graphical and numerical points of view. The course integrates technology to support pedagogy and computation. A prerequisite of MS 181 or equivalent by the Initial Math Assessment is required. Prerequisite(s): MS 181.

MS 212. Intermediate Applied Statistics. 3 Hours.

This course builds off the concepts learned in MS 132 while also serving as an introduction to a statistical programming language (e.g., SAS, SPSS, or R). Through projects, major statistical methods are introduced including various hypothesis testing procedures, regression, analysis of variance, chi-square tests, and nonparametric statistics. Prerequisite(s): MS 132.

MS 221. Number Theory. 3 Hours.

In this course, students will explore the structure and properties of the Integers and some natural generalizations. Topics covered include unique factorization into primes, modular arithmetic, Fermat's Little Theorem and its applications, and may also include quadratic reciprocity, simple arithmetic functions, diophantine equations, factorization methods, primality testing, and cryptography. Prerequisite(s): MS 141 or MS 180 or MS 181 or MS 182.

MS 230. Multivariable Calculus. 4 Hours.

Extends the notions of single-variable Calculus to functions of several variables. Includes vector-valued functions, arc length, curvature, partial differentiation, the chain rule, and grad, div, curl, as well as iterated integrals. Prerequisite(s): MS 182.

MS 241. Linear Algebra with Applications. 3 Hours.

This course begins with a generalized study of systems of linear equations, developing the notion of vectors and matrices. From these ideas naturally follows the study of vector spaces of dimension three or larger, including bases, eigenvalues, eigenvectors, and matrix representations of linear transformations and change of bases. Applications discussed may include computer graphics, facial recognition, (internet) search optimization, linear programming, cryptography, Leontief economic analysis. Prerequisite(s): MS 181.

MS 250. Introduction to Proof. 3 Hours.

This course provides an introduction to the notion of mathematical proof, including a variety of techniques such as proof by contradiction and proof by mathematical induction. Topics covered typically include elementary logic, set theory, number theory, or abstract algebra, although no background is assumed in any of these areas. Students learn how to write proofs using proper notation, clear and concise language, in part by multiple revisions of their own work and critiques of others'. Prerequisite(s): MS 180.

MS 251. Discrete Mathematics. 3 Hours.

This course introduces abstract mathematical structures used to represent discrete objects, including sets, permutations, relations, graphs, and trees. Emphasis is on mathematical reasoning, combinatorial analysis, and algorithmic thinking. Applications of the material are selected from subject areas ranging from computer science to geography. Prerequisite(s): MS 180.

MS 258. Introduction to Differential Equations with Linear Algebra. 4 Hours.

Differential Equations is the study of how to identify a function from equations involving the derivatives of the function. These types of equations arise naturally in a number of places, among them biological population models, radioactive decay, heat diffusion, motion. A variety of techniques will be explored, such as separation of variables, integrating factors, variation of parameters, undetermined coefficients, and the Laplace transform. This course also includes an introduction to elementary linear algebra. Prerequisite(s): MS 182.

MS 273. Introduction to Cryptography. 3 Hours.

This course introduces students to the rapidly growing field of cryptography, an application of algebra. Cryptography is an indispensable tool for protecting information in computer systems. This course explains the inner workings of cryptographic primitives and their applications. Topics range from classical cryptosystems, some of which are thousands of years old, to the cutting-edge area of quantum cryptography. Relevant topics from number theory will be covered as well. Prerequisite(s): MS 141 or MS 180 or MS 181 or MS 182.

MS 299. Topic/. 1-6 Hour.

This course is intended to provide the opportunity to offer introductory courses in mathematics that would not normally be a part of the Husson curriculum. As such the topics will depend upon the interests of students and faculty.

MS 332. Applied Statistics. 3 Hours.

This course introduces students to linear regression and statistical modeling. After a brief review of basic statistics concepts, students will study simple linear regression, multiple linear regression, regression diagnostics, transformations, model selection procedures, common difficulties encountered with regression analysis, and other topics as time permits. Statistical software will be used to summarize data sets and build models. Prerequisite(s): MS 132.

MS 333. Statistical Modeling. 3 Hours.

This course introduces students to regression and statistical modeling. Topics include method of least squares, residual analysis, data transformations, polynomial regression, generalized linear models, logistic regression, and model selection methods. Other topics may include time series analysis, Bayesian models, and spatial models. Statistical software is used to summarize data sets and build models. Prerequisite(s): MS 212.

MS 345. Biostatistics. 3 Hours.

Biostatistics encompasses the application and use of statistical procedures for the purposes of obtaining a better understanding of variations in data and information on living systems. Students will become familiar with one, or more, statistical software packages which will have descriptive and analytic statistical capabilities as well as report writing capacity. This course will instruct students on how to use and interpret data and information through the application of the principles of statistical inference. Specific diseases and public health issues will be used as examples to illustrate the application and use of biostatistical principles. Prerequisite(s): SC 224 or SC 383.

MS 411. Introduction to Abstract Algebra. 3 Hours.

This is a first course in Abstract Algebra, the language of modern mathematics. This course introduces students to this language through a study of groups, rings, integral domains, and unique factorization domains. Applications of abstract algebra to such fields as physics, chemistry, and computer science will be explored as well. Prerequisite(s): MS 181 and MS 250.

MS 412. Abstract Algebra II. 3 Hours.

This is a second course in Abstract Algebra, focusing on the principles of Galois theory. Topics include fields, algebraic extensions, normal extensions, and further study of groups and rings. Prerequisite(s): MS 411.

MS 421. Introduction to Mathematical Analysis. 3 Hours.

This course formally introduces main concepts in the field of real analysis, the mathematical analysis of functions of a real variable. Although Calculus was discovered independently by Newton and Leibniz in the seventeenth century, the mathematics behind it was not formalized until the nineteenth century. Mathematical analysis formalizes the delta-epsilon definition of limit and related concepts, including limits which are used in calculus to define derivatives and integrals, thus making precise the mathematics behind the calculus. Prerequisite(s): MS 182.

MS 430. Introduction to Probability and its Applications. 3 Hours.

This course is designed to provide a strong basis in probability for students who may go on to deeper studies of statistics, mathematics, engineering, business, or the physical and biological sciences. Topics include foundations of axiomatic probability, conditional probability and independence, discrete and continuous probability distributions, multivariate distributions, and limiting distributions. Applications of the material will be selected from subject areas ranging from epidemiology to securities trading. Prerequisite(s): MS 182.

MS 431. Complex Analysis. 3 Hours.

Functions of complex variables are of surprisingly great importance in numerous branches of pure mathematics. Analysis of such functions is a key tool in the proofs of many theorems concerning seemingly unrelated branches of mathematics, such as the famous Prime Number Theorem regarding the distribution of the prime numbers. Complex Variables also play a crucial role in a number of branches of science, including physics and engineering. This course touches upon the purely mathematical aspects of complex analysis while also applying the concepts to a wide array of real-world problems in the sciences. Prerequisite(s): MS 182 and MS 230.

MS 441. Introduction to Numerical Analysis. 3 Hours.

This course introduces algorithms commonly deployed for solving numerical computation problems formulated in science and engineering. Emphasis is on issues of implementation, including the accuracy, computational efficiency, and stability of each algorithm considered in the course. Topics are chosen from the numerical solution of nonlinear equations, interpolation and polynomial approximation, numerical integration and differentiation, numerical linear algebra, initial and boundary value problems for ordinary differential equations, and least squares approximations. Prerequisite(s): MS 230 and MS 241.

MS 450. Modeling and Simulation. 3 Hours.

This course introduces computer simulation as a research tool through its application to problems from calculus, differential equations, linear algebra, graph theory, dynamical systems, and physics. Prerequisite(s): MS 181 and MS 182.

MS 451. Nonlinear Dynamics. 3 Hours.

This course will add another option for the math minor, and would be an elective in a mathematics major (when/if that major becomes available). Biology and chemistry students would also benefit from this elective as well since many of the equations and models studied are biological or chemical in origin. Prerequisite(s): MS 258.

MS 454. Topology I. 3 Hours.

Sometimes referred to as rubber-sheet geometry, topology is the branch of geometry concerning those properties which remain unchanged by any bending or stretching, as long as there is no cutting or pasting. Topics will include topological spaces, open and closed sets, continuous functions, interior and limit points, boundary, compactness and connectedness. Also, students will learn how to construct new topological spaces from old ones. The course will include a final project involving an introduction to some more advanced concepts. Prerequisite(s): MS 181.

MS 456. Euclidean and non-Euclidean Geometries. 3 Hours.

This course begins with a thorough and rigorous treatment of Euclidean plane geometry, including classical proofs, straightedge and compass constructions, trigonometry, the dot product and the Euclidean Parallel Postulate. The course continues with a study of Elliptical geometry, in which the curvature is positive, and there are no parallel lines, and the angle sum of any triangle is bigger than 180 degrees and Hyperbolic geometry, where there is negative curvature, and there are infinitely many parallel lines through a given point not on a given line. Other examples considered include crochet, tessellations and the art work of the famous artist M.C. Escher, the film Flatland and Professor Thomas Banchoff's film on the Hyper-Cube. The course concludes with a discussion of possible implications and generalizations including the geometry of other kinds of surfaces such as the torus. Prerequisite(s): MS 181.

MS 499. Topic/. 1-3 Hour.

This course is intended to provide the opportunity to offer advanced courses in mathematics that would not normally be a part of the Husson curriculum. As such the topics will depend upon the interests of students and faculty.

MS 92. Fundamentals of Mathematics. 4 Hours.

This course reviews fundamental principles and applications of arithmetic and serves as preparation for MS 093 Core Arithmetic and Algebra. The course does not satisfy degree requirements. Five contact hours per week. A minimum grade of C is required. Four credit hours.

MS 93. Core Arithmetic and Algebra. 4 Hours.

Core Arithmetic and Algebra provides a review of necessary concepts and skills required for success in general education college mathematics, and serves as preparation for MS 141 Contemporary College Algebra. The course does not count toward the degree. A minimum grade of C is required. Students are registered based on the results of their Initial Math Assessment.