

MATHEMATICS

Mission

The mission of the Math program is to produce graduates who have developed mathematical ability and knowledge of the depth and breadth of mathematics, who can communicate about and with mathematics, who use technology to support problem solving and promote understanding, and who apply the mathematical sciences, including statistics, in other academic disciplines.

Student Learning Outcomes

Math students at Chadron State College will:

- Develop mathematical ability and knowledge of the depth and breadth of mathematics.
- Communicate about and with mathematics.
- Use technology to support problem solving and promote understanding.
- Apply the mathematical sciences, including statistics, in other academic disciplines.
- Bachelor of Science - Subject Major in Mathematics (<http://catalog.csc.edu/undergraduate/programs/mathematics/bs-subject-major-mathematics/>)
- Bachelor of Science in Education - Field Endorsement in Mathematics (Grades 6-12) (<http://catalog.csc.edu/undergraduate/programs/mathematics/bs-education-field-endorsement-mathematics-6-12/>)
- Bachelor of Science - Education - Middle Level Education Academic Area in Mathematics (Grades 5-9) (<http://catalog.csc.edu/undergraduate/programs/mathematics/bs-education-middle-level-education-academic-area-mathematics-5-9/>)
- Applied Statistics (<http://catalog.csc.edu/undergraduate/programs/mathematics/applied-statistics-minor/>)
- Mathematics (<http://catalog.csc.edu/undergraduate/programs/mathematics/mathematics-minor/>)

MATH 101 PRE-ALGEBRA3 Credits

A comprehensive review of arithmetic involving whole numbers, fractions, decimals, and signed numbers. Students will solve problems involving ratios, proportions, percent and geometry. Basic algebra concepts including working with variables, simplifying expressions, solving equations, and graphing will be introduced. Students will be introduced to the basic features of a graphing calculator.

Add Consent: Department Consent

Drop Consent: Department Consent

Notes: This course does not meet Essential Studies or specific program requirements.

MATH 102 PRE-COLLEGE ALGEBRA3 Credits

Problem-solving skills, applied algebra and geometry, and basic data analysis. The goal is to develop readiness for a college algebra or statistics course.

Prerequisites: ACT Math 16 or greater

Add Consent: Department Consent

Drop Consent: Department Consent

Notes: This course does not meet Essential Studies or specific program requirements.

MATH 132 APPLIED MATHEMATICS3 Credits

Mathematics with problem solving as the focus. Mathematical functions, measurement, the metric system, ratios, proportion, direct and inverse variation, graphing, and applications to technology. History of mathematics.

Essential Studies: SLO #4

MATH 133 INTRODUCTION TO MATHEMATICS3 Credits

Everyday mathematics with practical applications. A study of various topics including estimation, consumer mathematics, finance, probability and statistics, with an emphasis on critical thinking and interpreting results as they relate to being an informed and productive citizen in our society.

Essential Studies: SLO #4

MATH 134 PLANE TRIGONOMETRY3 Credits

Angle measurement, circular functions, inverse trigonometric functions, trigonometric functions of an acute angle, solutions of right triangles, law of sines, law of cosines, additional theorems and related formulas, trigonometric identities, and applications.

Essential Studies: SLO #4

MATH 135 PRE-CALCULUS MATHEMATICS3 Credits

A mathematical modeling approach to diverse real-world applications in many fields. Algebraic analysis of polynomials, rational, exponential, and logarithmic functions. Trigonometry concepts such as circular functions, inverse functions, solving equations, Law of Sines and Cosines.

Essential Studies: SLO #4

Prerequisites: ACT Math greater than 19 or MATH 102

MATH 137 MATHEMATICS TOPICS FOR ELEMENTARY TEACHERS3 Credits

Algebra operations, properties, functions and systems of equations and inequalities. Discrete mathematics topics, including logic, discounts, taxes, buying a house, credit cards, and problem solving. History of mathematics.

Essential Studies: SLO #4

MATH 138 APPLIED CALCULUS3 Credits

Differential and integral calculus with applications from business, economics, life sciences, physical sciences and social sciences.

Essential Studies: SLO #4

MATH 142 COLLEGE ALGEBRA4 Credits

A mathematical modeling approach to diverse real-world applications in many fields. Algebraic, exponential, and logarithmic functions are developed graphically, numerically, symbolically, and verbally. Graphing calculators and other technologies are used extensively as descriptive and problem solving tools.

Essential Studies: SLO #4

Prerequisites: ACT Math greater than 19 or MATH 102

MATH 151 CALCULUS I5 Credits

Traditional approach to limits, continuity, differential calculus with applications, and an introduction to integral calculus.

Essential Studies: SLO #4

Prerequisites: Advanced high school mathematics including trigonometry or MATH 135

MATH 232 APPLIED STATISTICS3 Credits

Descriptive statistics and statistical inference, with applications from business, economics, life and social sciences. Cannot be used by Mathematics majors in their minor.

Essential Studies: SLO #4

MATH 235 MATHEMATICS FOR THE ELEMENTARY TEACHER I3 Credits

Structure of the real number system and its subsystems, with emphasis on basic concepts and computational techniques. Elementary concepts of sets, numeration systems, elementary number theory, modular arithmetic, and calculators and computers as teaching tools.

Prerequisites: MATH 137

Notes: Does not apply toward Essential Studies mathematics requirement.

MATH 236 HISTORY OF MATHEMATICS3 Credits

Students will learn about the development of mathematics from the early Egyptian period to modern times, study prominent mathematicians and their major accomplishments, and know about many classical and modern mathematical problems.

Essential Studies: SLO #8

MATH 237 HISTORY AND FOUNDATIONS OF MATHEMATICS3 Credits

Logic, proof, relations, sets, functions, and history of mathematics.

Prerequisites: MATH 142 or MATH 151

MATH 238 MATHEMATICS FOR THE ELEMENTARY TEACHER II3 Credits

Geometry, probability, and statistics for elementary and middle grade levels. Does not apply toward Essential Studies mathematics requirement.

Prerequisites: MATH 235

MATH 239 DISCRETE MATHEMATICS3 Credits

Graph theory, matrices, recurrence relations, linear programming, difference equations, combinatorics, Boolean algebra, and trees.

Applications included.

Essential Studies: SLO #4

MATH 252 CALCULUS II5 Credits

Integral calculus with applications of differentiation and integration.

Sequences and series.

Prerequisites: MATH 151

MATH 270 SPECIAL TOPICS1-3 Credits

Special topics appropriate for lower division credit.

Notes: May be repeated with different emphases for up to six hours of credit.

MATH 330 DIFFERENTIAL EQUATIONS3 Credits

Theory and solutions of ordinary differential equations and systems of differential equations. Modeling of science, engineering, and social science problem situations and phenomena, including power series methods.

Prerequisites: MATH 252 and Sophomore or above status

MATH 331 PROBABILITY AND STATISTICS3 Credits

Descriptive statistics, exploratory data analysis, probability, random variables and probability distributions, inferential statistics, point and interval estimation, hypothesis testing, correlation and regression. Applications from business, education, and science.

Prerequisites: MATH 151 or MATH 138 and Sophomore or above status

MATH 334 COLLEGE GEOMETRY3 Credits

Advanced plane geometry. Similar and congruent figures, logic, and constructions. Projective and other fields of geometry, both Euclidean and non-Euclidean.

Prerequisites: MATH 237 and Sophomore or above status

MATH 336 CALCULUS III3 Credits

Vector calculus and vector-valued functions, partial derivatives, multiple integrals, introduction to differential equations, and line and surface integrals.

Prerequisites: MATH 252 and Sophomore or above status

MATH 337 LINEAR ALGEBRA3 Credits

Two-dimensional vector spaces, linear transformations of the plane, orthogonality, and inner products. Vector space of n-tuples, subspaces, linear dependence, dimension and basis, matrices, and determinants.

Prerequisites: MATH 138 or MATH 151 and Sophomore or above status

MATH 339 THEORY OF NUMBERS3 Credits

Introduction to the ring of integers, Euclidean rings, divisibility, primes, primitive roots, indices, congruencies, Diophantine equations, number-theoretic functions, and cryptography, with an emphasis on applications.

Prerequisites: MATH 237 and Sophomore or above status

MATH 390 INTERNSHIP IN MATHEMATICS1-12 Credits

Provides practical experience as a mathematician in government, business or industry. Open to upper division students major in the area of mathematics.

Add Consent: Department Consent

Notes: Interested students should contact the Internship and Career Services Office to secure application materials; application should be made prior to the semester the internship will be started; the amount of credit will be based on the availability of a suitable work position, the qualifications of the applicant, and the work hours.

MATH 400 INDEPENDENT STUDY OR RESEARCH1-3 Credits

Study or research in an area of special interest.

Add Consent: Instructor Consent

Notes: The number of credit hours is determined by the topic and the amount of work required.

Requirements: Permission of instructor, School Dean, and Academic Vice President is required.

MATH 401 ADVANCED MATHEMATICS EDUCATION PERSPECTIVES3 Credits

A capstone course for students in the Mathematics 7-12 Field Endorsement and the Middle Grades (5-9) Mathematics Endorsement. Advanced perspectives addressing the teaching of algebra, pre-calculus, discrete mathematics for teachers, and introductory number theory are discussed. Emphasis is on the clear and precise explanations of mathematical ideas and the mathematical connections that are explored at these levels.

Prerequisites: Junior or above status

Add Consent: Instructor Consent

MATH 410 MATHEMATICS SEMINAR1 Credit

Research, development, and presentation of a formal paper regarding some topic of interest in mathematics.

Prerequisites: Junior or above status and a minimum of 9 credit hours of upper division mathematics

MATH 426 OPERATIONS RESEARCH3 Credits

Game theory, linear programming, simplex method, duality, transportation and assignment problems, introduction to dynamic programming, and queuing theory. Applications of business and industrial perspectives.

Prerequisites: MATH 138 or MATH 151 and MATH 232 or MATH 331 and Sophomore or above status

MATH 429 INTRODUCTION TO MODERN ALGEBRA3 Credits

An axiomatic approach to the real number system and group theory. Homomorphism, isomorphisms, rings, introduction to integral domains, fields and selected topics in abstract algebra.

Prerequisites: MATH 237 with "C" and Junior or above status

MATH 430 TOPICS IN MATHEMATICS1-3 Credits

Topics to meet the needs of students who have completed the regular course of study.

Prerequisites: Junior or above status

Notes: Can be repeated with different emphasis for a maximum of 6 hours credit.

MATH 433 STATISTICAL METHODS AND DATA ANALYSIS3 Credits

Statistical research methods and modeling of statistical problems. Chi-square tests, analysis of variance, one-way and multi-factorial designs, multiple regression and correlation. Nonparametric methods. Use of calculators and personal computer software.

Prerequisites: MATH 232 or MATH 331 and Junior or above status

MATH 434 INTRODUCTORY ANALYSIS3 Credits

Structure and topology of the real number line. Completeness, compactness, connectedness. Rigorous treatment of limits, sequences, series, convergence, functions and continuity, derivatives, and selected topics on integration theory.

Prerequisites: MATH 237 with "C" and Junior or above status

MATH 435 SAMPLING TECHNIQUES3 Credits

Statistical survey methods, sampling techniques, point and interval estimation of population parameters, population size determination, and communication of sample survey results. Applications from business, the natural sciences, and the social sciences.

Prerequisites: MATH 232 or MATH 331 and Junior or above status

MATH 437 MODERN ALGEBRA3 Credits

Axiomatic approach to rings, integral domains, polynomials, fields, ideals and factor rings, selected topics in abstract algebra, and an introduction to vector spaces and algebraic coding theory.

Prerequisites: MATH 429 and Junior or above status

MATH 438 NUMERICAL ANALYSIS3 Credits

Numerical modeling of phenomena using interpolation and approximation, systems of linear equations, integration, and numerical solutions to differential equations.

Prerequisites: MATH 252, MATH 330 and Junior or above status

MATH 439 THEORY OF STATISTICS3 Credits

Joint distribution concepts, conditional expectations, method of distribution functions, transformation, method of moment-generating functions, order statistics, sampling distributions, central limit theorem, continuous and discrete random variables.

Prerequisites: MATH 151, MATH 232 or MATH 331 and Junior or above status

MATH 440 MATH EDUCATION STANDARDS3 Credits

An integrated content/pedagogy course on mathematics teaching, assessment, and curriculum standards, based on major content areas of the K-12 curriculum.

Prerequisites: 50% of endorsement completed and junior or above status