Nebraska Wesleyan University

Mathematics and Computer Science

Catalog

2021-2022

About the Program

Mathematics is an intriguing field that helps us understand the world by modeling physical phenomena quantitatively and employing sound reasoning skills. A degree in mathematics offers students many options, including careers in business, government, industry, and teaching. Some students also pursue post-graduate education in mathematics, medicine, law, and science. Students studying mathematics at Nebraska Wesleyan University have opportunities to engage themselves fully in their education by working collaboratively with their peers, conducting research with faculty, teaching in the Math Tutoring Center, grading for courses, attending Math Club events, and presenting research at conferences.

Department Learning Outcomes
Majors will be able to:

1. Demonstrate problem-solving skills.
2. Prove theorems.
3. Learn independently.
4. Explain mathematics in oral and written form.
5. Use computer-based technology to assist in solving problems.
6. Pursue employment or further study.

Majors, Minors & Degrees

Majors

1. Integrative Data Science (B.A., B.S.)
2. Mathematics (B.A., B.S.)

Minors

1. Computer Science
2. Mathematics

Courses

CMPSC 1000 Introduction to Computational Problem Solving

3 hours

An introduction to computational problem-solving using a programming language. Students learn the syntax and semantics of a language and apply these to the solution of mathematical problems. Students review mathematical concepts and use them as the basis of algorithmic solution during a hands-on lab. The course is recommended for all who wish to explore computer science.
Prerequisite(s): Math ACT score of at least 21 or permission of the instructor.
(Normally offered each fall semester.)

Archway Curriculum: Foundational Literacies: Mathematical Problem Solving

CMPSC 1500 Program Design

4 hours

A disciplined approach to the development of programs to solve problems on a computer. Topics include data types, control structures, abstraction, and software development. A lab component introduces a high-level programming language and software tools.
Prerequisite(s): CMPSC 1000 Introduction to Computational Problem Solving or permission of the instructor.
(Normally offered each spring semester.)

CMPSC 2000 Data Structures

4 hours

A natural continuation of CMPSC 1500 Program Design concentrating on the motivation, design, implementation, and utilization of abstract data types. Topics include linked lists, stacks, queues, trees, and recursion. A lab component is incorporated.
Prerequisite(s): Grade of "C" or better in CMPSC 1500 Program Design.
(Normally offered alternate spring semesters.)

CMPSC 2600 Computer Architecture and Interfacing

4 hours

See PHYS 2600 Computer Architecture and Interfacing.

CMPSC 3100 Data Visualization

4 hours

A study of data visualization, including principles and techniques. Students will analyze the effectiveness of visualizations, create a wide array of visualizations, and communicate a story through them.

Prerequisite(s): Grade of "C" or better in CMPSC 1500 Program Design and grade of "C" or better in one of the following statistics courses: BUSAD 2100 Business and Economic Statistics, MATH 1300 Statistics, POLSC 2000 Introduction to Political Science Statistics,PSYCH 2100 Psychological Statistics or SOC 2910 Social Statistics.

CMPSC 3960 Special Projects

1-15 hours

Supervised individual projects for students on topics selected by the student in consultation with the instructor. Special Projects may not duplicate courses described in the catalog.
Prerequisite(s): Permission of the instructor.

CMPSC 3970 Internship

1-8 hours

On-the-job training in computer science in situations that satisfy the mutual interests of the student, the supervisor, and the instructor. The student will arrange for the position in accordance with the guidelines established by the department.
Pass/Fail only.
Prerequisite(s): Permission of the instructor and approval of the department chair.

CMPSC 4970 Internship

1-8 hours

On-the-job training in computer science in situations that satisfy the mutual interests of the student, the supervisor, and the instructor.
P/F only.
Prerequisite(s): Permission of the Program Director and junior or senior standing.

Archway Curriculum: Essential Connections: Experiential Learning: Intensive

CMPSC 4980 Capstone Project

3 hours

A mentored research project satisfying the mutual interests of the mentor and student. Students will keep a reflection journal throughout the experience and give a conference-style presentation at the end of the course. P/F only.

Prerequisite(s): Instructor permission and completion of Research or Disciplinary Practice requirement.

Archway Curriculum: Essential Connections: Experiential Learning: Intensive

MATH 1000 Mathematics for Liberal Arts

3 hours

An investigation of the application of mathematical reasoning and problem solving. Topics may include networks, linear programming, data sampling and analysis, voting systems, game theory, measurement analysis, and coding.
(Normally offered each fall semester.)

Archway Curriculum: Foundational Literacies: Mathematical Problem Solving

MATH 1010 Mathematics and Democracy

3 hours

A study of various aspects of mathematics pertinent to a democracy including voting methods, logic of argumentation, statistics in the media, and financial mathematics.
(Normally offered each spring semester.)

Archway Curriculum: Foundational Literacies: Mathematical Problem Solving
Archway Curriculum: Integrative Core: Democracy Thread

MATH 1090 Intermediate Algebra

3 hours

A study of properties of real numbers, linear and nonlinear inequalities, factoring, exponents and radicals, linear and polynomial equations, fractional equations, functions and their graphs. Emphasis on mathematical modeling and problem-solving. This course does not fulfill any degree requirements.

MATH 1100 College Algebra

3 hours

A study of functions from algebraic, graphical, numerical and modeling perspectives. The functions are chosen from among linear, polynomial, rational, exponential and logarithmic.
Prerequisite(s): Math ACT score of at least 21.
(Normally offered each semester.)

Archway Curriculum: Foundational Literacies: Mathematical Problem Solving

MATH 1200 Mathematics for Elementary Teachers

3 hours

A course for elementary education majors designed to promote a deep understanding of elementary mathematics topics, including the decimal system, fractions, percentages, arithmetic operations and problem-solving. Emphasis is placed on

communicating mathematics, both in writing and orally.
(Normally offered each fall semester.)

MATH 1300 Statistics

3 hours

An introduction to statistics concepts with an emphasis on applications. Topics include descriptive statistics, discrete and continuous probability distributions, the central limit theorem, confidence intervals, hypothesis testing, and linear regression.
(Normally offered each fall semester.)

Archway Curriculum: Foundational Literacies: Mathematical Problem Solving

MATH 1400 Pre-Calculus

4 hours

A study of elementary functions, their graphs, and applications, including polynomial, rational, algebraic, exponential, logarithmic, and trigonometric functions.
Prerequisite(s): Math ACT score of at least 24 or grade of "C" or better in MATH 1100 College Algebra.

Archway Curriculum: Foundational Literacies: Mathematical Problem Solving

MATH 1450 Finite Mathematics

4 hours

A survey of specialized mathematical techniques used to solve contemporary problems in business, economics and the social sciences. Topics may include linear regression, mathematical finance, systems of equations, matrix algebra, linear programming, enumeration, probability, and statistics.
Prerequisite(s): Math ACT of at least 24 or a grade of "C "or better in MATH 1100 College Algebra.
(Normally offered each semester.)

Archway Curriculum: Foundational Literacies: Mathematical Problem Solving

MATH 1470 Trigonometry

2 hours

A study of trigonometric functions, identities, equations, and their applications.
Prerequisite(s): Math ACT score of at least 24 or a grade of "C" or better in MATH 1100 College Algebra.
MATH 1100 College Algebra and MATH 1470 Trigonometry may be taken concurrently with the permission of the Trigonometry instructor or department chair.
(Normally offered during the last 8 weeks of each semester in an online format.)

MATH 1500 Calculus for Management, Biological, and Social Sciences

4 hours

A calculus course for non-mathematics majors. Topics include limits, continuity, differentiation, and integration with emphasis on relevant applications.
Prerequisite(s): Math ACT score of at least 24 or grade of "C" or better in MATH 1100 College Algebra.
(Normally offered once a year.)

Archway Curriculum: Foundational Literacies: Mathematical Problem Solving

MATH 1600 Calculus I

5 hours

An introduction to calculus of a single variable. Topics include limits, continuity, differentiation, and beginning integration with applications. Assignments are given that help build proficiency in the use of a computer algebra system.
Prerequisite(s): Math ACT score of at least 27 or a grade of "C" or better in MATH 1470 Trigonometry or MATH 1400 Pre-

Calculus.
(Normally offered each semester.)

Archway Curriculum: Foundational Literacies: Mathematical Problem Solving

MATH 1610 Calculus II

5 hours

A continuation of MATH 1600 Calculus I. Topics studied include integration techniques and applications, differential equations, numerical approximations, sequences and series, and vectors. Assignments are given that help build proficiency in the use of a computer algebra system.
Prerequisite(s): Permission of the department chair or grade of "C" or better in MATH 1600 Calculus I.
(Normally offered each semester.)

Archway Curriculum: Foundational Literacies: Mathematical Problem Solving

MATH 1950 Independent Study

1-4 hours

This is a course where a student works independently on a topic. The student initially meets with the department chair to select a study topic. At this time the student will be assigned a faculty resource person to guide his or her work and assist in an advisory capacity. A copy of the student's work is filed in the archives for the department. Independent Study may not duplicate courses described in the catalog.
Prerequisite(s): Permission of the department chair.

MATH 1970 Internship

0-8 hours

An on-the-job experience oriented toward the student's major interest. The student is to secure a position in an organization that satisfies the mutual interests of the instructor, the sponsor, and the student. P/F Only.
Prerequisite(s): Permission of the department chair.

Archway Curriculum: Essential Connections: Experiential Learning: Exploratory

MATH 2200 Introduction to Higher Mathematics

3 hours

A study of mathematical induction and other methods of proof, recursion, formal logic, and set theory.
Prerequisite(s): Grade of "C" or better in MATH 1610 Calculus II or permission of the instructor.
(Normally offered each spring semester.)

Archway Curriculum: Foundational Literacies: Mathematical Problem Solving
Archway Curriculum: Essential Connections: Writing Instructive

MATH 2600 Calculus III

4 hours

An introduction to multivariable calculus. Topics include vector-valued functions, functions of several variables, partial derivatives, multiple integrals, and analysis. Assignments are given that help build proficiency in the use of a computer algebra system.
Prerequisite(s): Permission of department chair or grade of "C" or better in MATH 1610 Calculus II.
(Normally offered each fall semester.)

Archway Curriculum: Foundational Literacies: Mathematical Problem Solving

MATH 2700 Tutoring Experience

0 hours

A tutoring experience comprised of at least 20 hours of mathematics tutoring. Tutoring may include, but is not limited to, these types: volunteer tutoring, tutoring at NWU's Math Tutoring Center or private tutoring. A reflection component is required.
Prerequisite(s): Permission of Department Chair.
Pass/Fail Only.

Archway Curriculum: Essential Connections: Experiential Learning: Exploratory

MATH 2950 Independent Study

1-4 hours

This is a course where a student works independently on a topic. The student initially meets with the department chair to select a study topic. At this time the student will be assigned a faculty resource person to guide his or her work and assist in an advisory capacity. A copy of the student's work is filed in the archives for the department. Independent Study may not duplicate courses described in the catalog.
Prerequisite(s): Sophomore standing and permission of the department chair.

MATH 2970 Internship

1-8 hours

An on-the-job experience oriented toward the student's major interest. The student is to secure a position in an organization that satisfies the mutual interests of the instructor, the sponsor, and the student. P/F Only.
Prerequisite(s): Permission of the department chair.

Archway Curriculum: Essential Connections: Experiential Learning: Intensive

MATH 3100 Differential Equations

4 hours

A study of ordinary differential equations. Topics include first- and higher-order, linear and nonlinear differential equations with applications. Additional topics may be chosen from systems of differential equations, transform techniques, and numerical methods. Use will be made of a computer algebra system.
Prerequisite(s): Grade of "C" or better in MATH 1610 Calculus II.
(Normally offered each spring semester.)

MATH 3200 Linear Algebra

3 hours

A study of vector spaces, determinants, linear transformations, matrices, matrix equations, and their applications in the natural and social sciences.
Prerequisite(s): Grade of "C" or better in MATH 1610 Calculus II.
(Normally offered each spring semester.)

MATH 3300 Mathematical Statistics I

3 hours

An introduction to basic probability and statistics concepts with an emphasis on applications. Topics include descriptive statistics, probability, Bayes' Theorem, discrete and continuous probability distributions, joint probability distributions, estimation and hypothesis testing.
Prerequisite(s): Grade of "C" or better in MATH 1610 Calculus II.
(Normally offered fall of even-numbered years.)

MATH 3500 Geometry

3 hours

Selected topics from Euclidean and non-Euclidean geometry, geometry as a mathematical structure, and geometry as a study of invariants of set transformations.
Prerequisite(s): Grade of "C" or better in MATH 2200 Introduction to Higher Mathematics.
(Normally offered fall of odd-numbered years.)

MATH 3600 Mathematical Problem Solving

1 hour

A seminar on problem solving skills and their application to nontrivial problems. May be repeated.
Prerequisite(s): Grade of "C" or better in MATH 2200 Introduction to Higher Mathematics or permission of the instructor.
(Normally offered each fall semester.)

MATH 3700 Mathematical Modeling

3 hours

A course that explores applications of mathematics to real-world problems. One or more topics may be chosen from the non-inclusive list: dynamical systems, linear programming, queueing theory, game theory, numerical analysis, wavelets, coding theory, and partial differential equations. Computer-based exercises will be a component of the course.
Prerequisite(s): Grade of "C" or better in MATH 1610 Calculus II.

MATH 3750 Numerical Analysis

3 hours

An introduction to the numerical approximation of solutions of various types of problems. Topics include root-finding, interpolation and numerical differentiation and integration. Additional topics may be drawn from numerical solutions of ordinary differential equations and linear systems.
Prerequisite(s): Grade of "C" or better in MATH 1610 Calculus II.
(Normally offered fall of odd-numbered years.)

MATH 3950 Independent Study

1-4 hours

This is a course where a student works independently on a topic. The student initially meets with the department chair to select a study topic. At this time the student will be assigned a faculty resource person to guide his or her work and assist in an advisory capacity. A copy of the student's work is filed in the archives for the department. Independent Study may not duplicate courses described in the catalog.
Prerequisite(s): Junior standing or permission of the department chair.

MATH 3970 Internship

1-8 hours

An on-the-job experience oriented toward the student’s major interest. The student is to secure a position in an organization that satisfies the mutual interests of the instructor, the sponsor, and the student. P/F Only.
Prerequisite(s): Permission of the department chair.

Archway Curriculum: Essential Connections: Experiential Learning: Intensive

MATH 4200 Abstract Algebra I

4 hours

A study of various algebraic systems arising in modern mathematics, such as groups and rings.
Prerequisite(s): Grade of "C" or better in MATH 2200 Introduction to Higher Mathematics.
(Normally offered fall of even-numbered years.)

MATH 4300 Real Analysis

4 hours

A formal approach to limits, continuity, differentiation, and integration with emphasis on the proofs of theorems. Additional topics may include topology, uniform continuity, and uniform convergence.
Prerequisite(s): Grade of "C" or better in MATH 2200 Introduction to Higher Mathematics and MATH 1610 Calculus II.
(Normally offered spring of even-numbered years.)

MATH 4800 Research Experience

0-3 hours

A guided, original research experience on a mathematical topic. This course will culminate in a conference-style presentation and written report. Students will keep a reflection journal throughout the experience.

Prerequisite(s): Instructor permission.

Archway Curriculum: Essential Connections: Experiential Learning: Intensive

MATH 4950 Independent Study

1-4 hours

This is a course where a student works independently on a topic. The student initially meets with the department chair to select a study topic. At this time the student will be assigned a faculty resource person to guide his or her work and assist in an advisory capacity. A copy of the student's work is filed in the archives for the department. Independent Study may not duplicate courses described in the catalog.
Prerequisite(s): Senior standing or permission of the department chair.

MATH 4970 Internship

1-8 hours

An on-the-job experience oriented toward the student’s major interest. The student is to secure a position in an organization that satisfies the mutual interests of the instructor, the sponsor, and the student. P/F Only.
Prerequisite(s): Permission of the department chair.

Archway Curriculum: Essential Connections: Experiential Learning: Intensive

MATH 4980 Mathematics Seminar

3 hours

A study of topics of special interest in mathematics. Students begin the course by studying an advanced topic in mathematics. Students then work on individualized projects culminating in a symposium presentation and survey paper.
Prerequisite(s): Major in mathematics, senior standing, grade of "C" or better in either MATH 4200 Abstract Algebra I or MATH 4300 Real Analysis, and permission of the instructor.
(Normally offered each spring semester.)

Archway Curriculum: Essential Connections: Writing Instructive
Archway Curriculum: Essential Connections: Speaking Instructive