Department/Program:

Mathematics

Majors, Minors & Degrees:

Majors
Mathematics (B.A., B.S.)

Minors
Mathematics

Students intending to work in scientific professions are encouraged to pursue a Bachelor of Science degree. The Bachelor of Arts degree is for those who want a core of mathematics courses with a broader background in the humanities or the arts.

Majors preparing for graduate study should take as many courses as possible in the department. Seniors in the department will participate in an exit interview.

Courses

MATH 1000 Mathematics for Liberal Arts (3 hours)

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

MATH 1100 College Algebra (3 hours)

A study of linear and quadratic equations and inequalities and their graphs; systems of equations and inequalities, algebraic exponential and logarithmic functions and their graphs. Other topics may be selected from sets, complex numbers, sequences and series, and probability.
Prerequisite(s): Math ACT score of at least 21.
(Normally offered each semester.)

MATH 1200 Mathematics for Elementary Teachers (3 hours)

A course designed to deepen prospective elementary school teachers' understanding of mathematics. Using reasoning and logic to understand the connections between various mathematical ideas will be emphasized.
(Normally offered each fall semester.)

MATH 1300 Statistics (3 hours)

A study of topics essential to an understanding of statistics and their applications. Topics include probability, discrete and normal probability distributions, sample variability, the central limit theorem, and linear regression.
(Normally offered each spring semester.)

MATH 1400 Pre-Calculus (4 hours)

A study of elementary functions, their graphs, and applications, including polynomial, rational, algebraic, exponential, logarithmic, trigonometric, and metric functions. Scientific calculators are required and graphing calculators are recommended.
Prerequisite(s): Math ACT score of at least 24 or grade of "C" or better in MATH 1100 College Algebra.
(Normally offered each semester.)

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 include linear regression, matrix algebra, optimization, logic, and probability.

Prerequisite(s): Math ACT of at least 24 or a grade of "C" or better in MATH 1100 College Algebra.
(Normally offered each semester.)

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.)

MATH 1550 Calculus for Biologists (4 hours)

A calculus course that emphasizes biological applications. Topics include Malthusian growth, limits, continuity, differentiation, optimization, differential equations, and integration. Assignments are given that involve spreadsheets and computer algebra systems.
Prerequisite(s): Math ACT score of at least 24 or grade of "C" or better in MATH 1100 College Algebra.

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.)

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.)

MATH 1900 Selected Topics (1-4 hours)

A topical course designed to investigate relevant subject matter not included in any standard courses. The title and the content will be determined by current mutual interests of students and faculty. This course may be offered to meet a requirement for a major only by approval of the department chair.

MATH 1950 Independent Study (1-4 hours)

This is a research course. The student initially meets with the department chair to select a study topic and review research methods. 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 1960 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.

MATH 1970 Internship (1-8 hours)

This course allows students to participate at a meaningful level in an internship with a public official, political figure, public agency, campaign or interest group and to use that experience as the basis for an academic paper.

Pass/Fail only.
Prerequisite(s): Permission of the department chair.

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.)

MATH 2600 Calculus III (4 hours)

An introduction to multivariable calculus. Topics include vector-valued functions, functions of several variables, partial differentiation, 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.)

MATH 2900 Selected Topics (1-4 hours)

A topical course designed to investigate relevant subject matter not included in any standard courses. The title and the content will be determined by current mutual interests of students and faculty. This course may be offered to meet a requirement for a major only by approval of the department chair.

MATH 2950 Independent Study (1-4 hours)

This is a research course. The student initially meets with the department chair to select a study topic and review research methods. 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 2960 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.

MATH 2970 Internship (1-8 hours)

This course allows students to participate at a meaningful level in an internship with a public official, political figure, public agency, campaign or interest group and to use that experience as the basis for an academic paper.
Pass/Fail only.
Prerequisite(s): Permission of the department chair.

MATH 2999 Experiential Learning (0 hours)

This course number corresponds to the "exploratory" level of experiential learning required in the Archway liberal education curriculum. Experiential learning is a process through which students expand, deepen, integrate, and apply knowledge and skills acquired in the classroom or laboratory. All experiential learning credit assumes the student is intentional about the experience, is adequately prepared for it, is taking initiative, making decisions, and assuming responsibility, and will reflect meaningfully on the learning that takes place. Instructors or sponsors are expected to create experiential learning opportunities that are authentic, and to monitor and assess the activities. The student must complete at least 20 hours of experiential learning.
Prerequisite(s): Instructor Permission.

MATH 3000 Formal Languages and Automata (3 hours)

See CMPSC 3000 Data Structures.

MATH 3100 Differential Equations (4 hours)

A study of ordinary differential equations. Topics include first and higher order, and 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, and 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)

Elementary mathematical theory and applications of basic probability to statistics. Topics studied include random variables, both discrete and continuous, and their probability distributions with appliations of a practical nature to numerous fields. Also studied are multivariate probability distributions.
Prerequisite(s): Grade of "C" or better in MATH 1610 Calculus II.
(Normally offered fall of even-numbered years.)

MATH 3310 Mathematical Statistics II (3 hours)

A continuation of MATH 3300 Mathematical Statistics I, with further applications of probability theory to statistical problems of estimation and hypothesis testing, including least squares estimation and correlation. Also studied is analysis of variance with numerous applications of this technique.
Prerequisite(s): Grade of "C" or better in MATH 3300 Mathematical Statistics I.

MATH 3400 Number Theory (3 hours)

A study of fundamental concepts in number theory, including divisibility and factorization of integers, linear and quadratic congruences, the quadratic reciprocity theorem, Diophantine equations, number-theoretic functions, and continued fractions. Additional topics may include Euler's theorem and cryptography, perfect numbers and Mersenne primes, Pythagorean triples, and Fermat's Last Theorem.
Prerequisite(s): Grade of "C" or better in MATH 1610 Calculus II.

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 Foundations of Modern 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. Students will be required to take the Putnam Exam. May be repeated.
Prerequisite(s): Grade of "C" or better in MATH 2200 Foundations of Modern 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.

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 3900 Selected Topics (1-4 hours)

A topical course designed to investigate relevant subject matter not included in any standard courses. The title and the content will be determined by current mutual interests of students and faculty. This course may be offered to meet a requirement for a major only by approval of the department chair.

MATH 3950 Independent Study (1-4 hours)

This is a research course. The student initially meets with the department chair to select a study topic and review research methods. 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 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.

MATH 3970 Internship (1-8 hours)

This course allows students to participate at a meaningful level in an internship with a public official, political figure, public agency, campaign or interest group and to use that experience as the basis for an academic paper.
Pass/Fail only.
Prerequisite(s): Permission of the department chair.

MATH 4200 Abstract Algebra I (3 hours)

A study of various algebraic systems arising in modern mathematics, such as groups and rings.
Prerequisite(s): Grades of "C" or better in MATH 2200 Foundations of Modern Mathematics and any 3000-level or 4000-level mathematics course.
(Normally offered fall of even-numbered years.)

MATH 4210 Abstract Algebra II (3 hours)

A continuation of MATH 4200 Abstract Algebra I. More study of groups, rings, and fields. Additional topics may be drawn from modules and finite fields.
Prerequisite(s): Grade of "C" or better in MATH 4200 Abstract Algebra I.

MATH 4300 Real Analysis (3 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 Foundations of Modern Mathematics and MATH 2600 Calculus III.
(Normally offered spring of even-numbered years.)

MATH 4900 Selected Topics (1-4 hours)

A topical course designed to investigate relevant subject matter not included in any standard courses. The title and the content will be determined by current mutual interests of students and faculty. This course may be offered to meet a requirement for a major only by approval of the department chair.

MATH 4910 Directed Readings (1-6 hours)

An opportunity for students, under the supervision of a faculty member, to pursue scientific literature not covered in other coursework.

MATH 4950 Independent Study (1-4 hours)

This is a research course. The student initially meets with the department chair to select a study topic and review research methods. 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 4960 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.

MATH 4970 Internship (1-8 hours)

This course allows students to participate at a meaningful level in an internship with a public official, political figure, public agency, campaign or interest group and to use that experience as the basis for an academic paper.
Pass/Fail only.

Prerequisite(s): Permission of the department chair.

MATH 4980 Mathematics Seminar (3 hours)

A study of topics of special interest in mathematics. Students will be required to make at least three presentations including individual study of a specific mathematics topic under the supervision of the faculty.
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.)

MATH 4990 Senior Project (0-4 hours)

Independent field research for all majors.

MATH 4999 Experiential Learning (0 hours)

This course number corresponds to the "intensive" level of experiential learning required in the Archway liberal education curriculum. Experiential learning is a process through which students expand, deepen, integrate, and apply knowledge and skills acquired in the classroom or laboratory. All experiential credit assumes the student is intentional about the experience, is adequately prepared for it, is taking initiative, making decisions, and assuming responsibility, and will reflect meaningfully on the learning that takes place. Instructors or sponsors are expected to create experiential learning opportunities that are authentic, and to monitor and assess the activities. The student must complete at least 40 hours of experiential learning.
Prerequisite(s): Instructor Permission.