

2021-22 ACADEMIC CATALOG

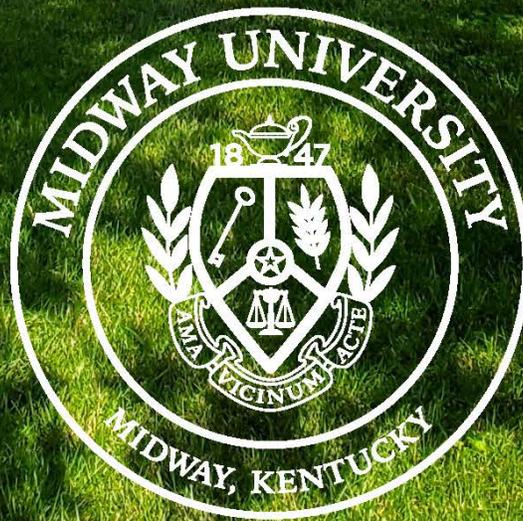


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The Bachelor of Arts in Mathematics provides an opportunity for students to fulfill their potential and become contributing members of society in fields that are becoming increasingly important and in which there is growing demand. Students who complete this program will have the skills in logic, problem-solving and data analysis and the familiarity with mathematical concepts necessary for success in such fields as actuarial science, engineering, operations research, data processing, computer science, and Education. In addition, a broad-based background in mathematics has applicability for study or employment in fields outside of mathematics and science, e.g., banking, law, and economics.

Student Learning Outcomes of Program

- Students will be able to effectively apply critical thinking skills to mathematically model and solve problems.
- Students will be able to critically interpret numerical and graphical data.
- Students will be able to read and construct mathematical arguments and proofs.
- Students will be able to effectively use computer technology to solve problems and create models.
- Students will be able to demonstrate effective oral and written communication of mathematical concepts and applications.

- Students will be able to demonstrate applications of mathematical knowledge to a mathematically-related career or post-baccalaureate studies.

Students who are non-majors in Mathematics will be able to:

- Effectively apply appropriate quantitative tools and logic to analyze and synthesize information for problem solving in specific career fields as well as common life experiences.

Courses

Major Course Requirements

MTH 220 - Calculus I

Calculus I is a standard introductory calculus course: limits and continuity; differentiation; applications of derivatives in a variety of situations; definite and indefinite integration; applications of integrals in a variety of situations; derivatives and integrals of certain transcendental functions. Prerequisites: MTH 140 and MTH 143 with a minimum grade of C or a suitable test score, ACT Math score of 27 (minimum) or equivalent SAT Math score.

Grade Basis: Letter Grade

Credit hours: 4.0

Lecture hours: 4.0

Prerequisites:

- MTH 140 - College Algebra
 - MTH 143 - Trigonometry
-

MTH 222 - Calculus II

Calculus II covers techniques and applications of integration and the calculus of transcendental functions. Prerequisite: MTH 220.

Grade Basis: Letter Grade

Credit hours: 4.0

Lecture hours: 4.0

Prerequisites:

- MTH 220 - Calculus I
-

MTH 223 - Calculus III

Calculus III covers topics in polar coordinates, vector calculus, partial differentiation and multiple integrals. Prerequisite: MTH 222.

Grade Basis: Letter Grade

Credit hours: 4.0

Lecture hours: 4.0

Prerequisites:

- MTH 222 - Calculus II
-

MTH 245 - Probability and Statistics

This is a standard introductory course in probability and statistics. Topics include: working with random samples; organizing data into frequency distributions and histograms; computing various measures of central tendency and variation; elementary probability theory including compound events and conditional probability; working with random variables; the normal distribution; the sampling distribution of the mean; testing hypotheses using the sampling distribution of the mean. Prerequisite: MTH 140.

Grade Basis: Letter Grade

Credit hours: 3.0

Lecture hours: 3.0

Prerequisites:

- MTH 140 - College Algebra
-

MTH 301 - Differential Equations

An investigation into the solution of ordinary equations including, but not limited to, the following: equations of order one via separation of variables, homogeneous coefficients, integrating factors, and substitution; linear equations via matrix methods and differential operators; transform methods; and series solutions. Both analytic and numerical solutions will be considered. Application of methods to the fields of science and mathematics will be an important part of this course. Prerequisite: MTH 222.

Grade Basis: Letter Grade

Credit hours: 3.0

Lecture hours: 3.0

Prerequisites:

- MTH 222 - Calculus II
-

MTH 305 - Mathematical Reasoning and Proofs

Transition to advanced mathematics is designed to help students learn the principles of mathematical reasoning and the writing of proofs. It is designed for students planning to take advanced mathematics courses. Topics include active reading of mathematics, problem-solving, logical reasoning and communication of mathematics, direct and indirect proofs, and proof by induction. Corequisite or prerequisite: MTH 222.

Grade Basis: Letter Grade

Credit hours: 3.0

Lecture hours: 3.0

Prerequisites:

- MTH 222 - Calculus II
-

MTH 310 - Linear Algebra

This first course in abstract mathematics also covers topics which have powerful practical applications. Linear algebra is a study of linear equations and systems of linear equations. A variety of types of examples of equations and systems is considered for the development of concepts, theory and computation skills (solving systems of linear equations), matrices and vector spaces as abstract expressions of equations. Systems are studied in depth as they relate to linear equations. Prerequisite: MTH 220 with a minimum grade of C.

Grade Basis: Letter Grade

Credit hours: 3.0

Lecture hours: 3.0

Prerequisites:

- MTH 220 - Calculus I
-

MTH 320 - Discrete Mathematics

This course studies the mathematical elements of computer science including propositional logic, predicate logic, sets, functions and relations, combinatorics, mathematical induction, recursion, relations, algorithms, matrices, graphs, trees, Boolean logic, and algebraic structure, with applications. As a beginning course in abstract thinking, this course will lay a basic foundation for mathematical proofs. During the course of the semester, students will learn to recognize and express mathematical ideas graphically, numerically, symbolically, and in writing. Prerequisite: MTH 220 with a minimum grade of C.

Grade Basis: Letter Grade

Credit hours: 3.0

Lecture hours: 3.0

Prerequisites:

- MTH 220 - Calculus I

Choose three of the following:

MTH 315 - Mathematical Statistics I

Mathematical Statistics is a calculus-based treatment of probability, random variables, discrete and continuous distributions, conditional probability, independence, moment generating functions, limit theorems, and estimation. Prerequisite: MTH 223.

Grade Basis: Letter Grade

Credit hours: 3.0

Lecture hours: 3.0

Prerequisites:

- MTH 223 - Calculus III
-

MTH 401 - Abstract Algebra I

This course offers a study algebraic structures, beginning with groups. Group theory topics include permutation groups, cyclic groups, subgroups, normal subgroups, co-sets, quotient groups, group homomorphisms, Cayley's and Sylow's Theorems. The course includes an introduction to the algebraic structure of rings, including the topics of subrings, ideals, ring homomorphisms, and polynomial rings. This course emphasizes proof and connecting the abstract back to the concrete. Prerequisite: MTH 305 with a minimum grade of C.

Grade Basis: Letter Grade

Credit hours: 3.0

Lecture hours: 3.0

Prerequisites:

- MTH 305 - Mathematical Reasoning and Proofs
-

MTH 405 - Real Analysis I

This course introduces the student to a rigorous development of the real number system and theory of calculus. Topics include the real number system, sequences and series, limits and continuity, the derivative, properties of continuous functions and some theorems of calculus. Prerequisites: MTH 223 and MTH 305 with a minimum grade of C.

Grade Basis: Letter Grade

Credit hours: 3.0

Lecture hours: 3.0

Prerequisites:

- MTH 223 - Calculus III
 - MTH 305 - Mathematical Reasoning and Proofs
-

MTH 498 - Senior Seminar

A capstone experience for mathematics majors in which students develop an individual research project. Each student in conversation with the seminar leader and other faculty members will present the research project to the campus community. Prerequisite: senior standing.

Grade Basis: Letter Grade

Credit hours: 3.0

Lecture hours: 3.0

Select either series of PSC courses below:

PSC 240 - Physics I

Course is the first of a two-semester sequence in general physics, including mechanics, heat, thermodynamics, sound and wave motion. Four hours lecture/recitation per week is required. Prerequisite: MTH 140 or MTH 220, ACT Math score of 27 (minimum) or equivalent SAT Math score.

Grade Basis: Letter Grade

Credit hours: 3.0

Lecture hours: 3.0

Prerequisites:

- MTH 140 - College Algebra
- MTH 220 - Calculus I

PSC 241 - Physics Laboratory I

Course provides laboratory experiments to accompany Physics I PSC 240. Two hours per week are required. Concurrent enrollment in or previous completion of PSC 240 required.

Grade Basis: Letter Grade

Credit hours: 1.0

Lab hours: 2.0

Prerequisites:

- PSC 240 - Physics I

PSC 250 - Physics for Engineers I

Analytical and quantitative development of principles of mechanics. Emphasis on consequence of the same. Prerequisite: MTH 220.

Grade Basis: Letter Grade

Credit hours: 4.0

Lecture hours: 4.0

Prerequisites:

- MTH 220 - Calculus I
-

PSC 251 - Physics for Engineers I Lab

Lab experiments to accompany PSC 250. Prerequisites: concurrent PSC 250.

Grade Basis: Letter Grade

Credit hours: 1.0

Lab hours: 2.0

Prerequisites:

- PSC 250 - Physics for Engineers I
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