

MATHEMATICS

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Faculty

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Lecturers

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Academic Programs	Credits
BS: Mathematics	39
Applied Mathematics	
Preparation for Secondary School Mathematics Teaching	
Preparation for Graduate Study in Mathematics	
BS: Mathematics Education	30
Major in Mathematical Studies	30
Minor in Mathematics	20

Mathematics is foundational to physics, engineering, and computer science, and is increasingly important in many fields of study such as finance, accounting, economics, biology, medicine, and environmental science. Students majoring in these and other fields will find that acquiring an additional major in mathematics or mathematical studies greatly enhances the marketability of their degree.

Undergraduate Programs

BS: Mathematics—39

MATH141, 142, 240, 281, 286, CPTR125, STAT340
And at least 15 credits in additional courses chosen in consultation with a departmental advisor from MATH355, 405, 408, 425, 431, 432, 441, 442, 475, 487, 495.

Major in Mathematical Studies—30

MATH141, 142, 240, 281 and at least 15 credits in additional courses chosen in consultation with a Mathematics Department advisor from STAT340, CPTR125, MATH286, 355, 405, 408, 425, 431, 432, 441, 442, 475, 487, 495. This major is available only as a second major, to those taking a major in another field.

Minor in Mathematics—20

MATH141, 142, 281 and at least 9 credits in additional courses chosen in consultation with a departmental advisor from MATH240, 286, 355, 405, 408, 425, 431, 432, 441, 442, 475, 487, 495, STAT340

BS: Mathematics Education—30

MATH141, 142, 240, 281, 286, CPTR125, STAT340 and at least 6 credits in additional courses chosen in consultation with a departmental advisor from MATH355, 405, 408, 425, 431, 432, 441, 442, 475, 487, 495. This major is available only to those who are obtaining elementary or secondary teacher certification.

SPECIAL REQUIREMENTS AND PLACEMENT TEST

Sequential Course Numbering. All courses with more than one course number must be taken sequentially.

Non-overlapping Credit Requirement.

Because there is substantial overlap in material covered in the following groups of courses, no student is granted credit (other than general elective credit) in more than one course from each group:

1. MATH141, 182 (Calculus)
2. MATH215, 281 (Linear Algebra)
3. MATH165, 168 (College Algebra, Algebra with Trigonometry)

Mathematics Placement Examination (MPE). Any student wishing to enroll in any mathematics or statistics course must have achieved appropriate scores on the MPE of this department, or have prerequisite course(s) accepted for credit. The minimum score on the MPE is indicated as the prerequisite for each course. **Minimum grade for prerequisites, except for MATH141, is C-.**

Graduate Programs

The Mathematics Department collaborates in the Master of Science: Interdisciplinary Studies (Mathematics and Physical Sciences). See the Interdisciplinary Studies section, p. 124.

Mathematics Endorsement Program for Middle School Educators. The Mathematics Department collaborates with the School of Education and the Berrien County Intermediate School District to administer the Alternative Certification Experimental Program (Math Endorsement Program) for Middle School Educators. Courses for this Program are listed under "Mathematics Education." Inquiries about this program should be directed to Larry Burton (616) 471-3465, burton@andrews.edu; Lynelle Weldon (616) 471-3866, weldon@andrews.edu; or Judy Wheeler (616) 471-7725 ext. 302, jwhee@remc11.k12.mi.us.

Courses

(Credits)

See inside front cover for symbol code.

MATH105 (2)

Mathematical Skills—Arithmetic

Designed to remedy the deficiencies, diagnosed by the Mathematics Placement Examination, in arithmetic skills, unit conversions, and problem solving. Does not apply toward any General Education requirement. *Fall, Spring*

MATH106 (3)

Mathematical Skills—Algebra

Remediation in algebraic skills. Outcome determines eligibility for entrance into certain first-level mathematics courses. Does not

apply toward any General Education requirements. Prerequisite: Acceptable MPE score.

MATH107 (1-3)

Algebra and Arithmetic Review

Provides review of mathematics skills for students needing minimal remediation. Most work is done on the computer using one or more software packages. Class attendance is required. Does not apply toward any General Education requirements. Prerequisite: Acceptable MPE score.

MATH141 (4)

Calculus I

Real functions and relations, differentiation and applications. Prerequisite: MPE 4.0 or MATH165 or MATH168 with grade no lower than C. *Fall, Spring*

MATH142 (4)

Calculus II

Continuation of Calculus I; Integration of functions; series. Prerequisite: MATH141. *Spring*

MATH165 (3)

College Algebra

A study of linear equations and inequalities; algebraic, logarithmic, exponential, and trigonometric functions; polynomials and complex numbers. Includes applications in business and science. Prerequisite: MPE of 2.0 or MATH106. *Fall, Spring*

MATH165 V (4)

College Algebra

Distance education—see content above.

MATH168 (4)

Algebra with Trigonometry

A study of linear equations and inequalities; algebraic, logarithmic, and exponential functions; polynomials and complex numbers. Includes trigonometric functions and identities. Primarily for Technology students. Prerequisite: MPE 2.0 or MATH106, and one year of high-school geometry. *Fall*

MATH182 (3)

Calculus with Applications

Introduction to calculus of functions of one variable, including finding maxima and minima; partial derivatives; applications to problems in business and the social sciences. Prerequisite: MPE 3.5 or MATH165 or MATH168. *Spring*

MATH215 (3)

Applied Linear Algebra

Vectors, matrices, determinants, and eigenvalues, with emphasis on applications. Credit may not be earned in this course and in MATH281. Prerequisites: MATH182 or 141. *Spring*

MATH240 (4)

Calculus III

Curves and surfaces, directional derivatives, multiple integrals, line and surface integrals, integral theorems. Prerequisite: MATH142. *Fall*

MATH281 (3)

Linear Algebra

Vector spaces, linear mappings, solution of sets of linear equations, bilinear and quadratic mappings. Prerequisite: MATH141 or consent of instructor. *Spring*

MATH286 (3)

Differential Equations

Elementary differential equations, First order equations, higher order linear equations, systems. Prerequisites: MATH142. *Spring*

MATH355 (3)

Discrete Mathematics

Selected topics in discrete mathematics, such as logic, set theory, relations, functions, algebraic structures and graph theory. Prerequisite: MATH141 or 182. *Fall*

MATH405 ♦ Alt (3)

Applied Mathematics

Function transforms applied to differential equations. Trigonometric series. Prerequisite: MATH240. *Fall*

MATH408 ♦ Alt (3)

Complex Analysis

Elementary complex analysis, contour integrals, complex series. Prerequisite: MATH240. *Spring*

MATH425 ♦ Alt (3)

Numerical Methods and Modeling

Construction of mathematical models. Implementing such models on a computer. Prerequisites: MATH141 or 281, or 215; and a knowledge of computer programming. *Spring*

MATH431, 432 ♦ Alt (3, 3)

Advanced Calculus

Introduction to topology; theorems on continuity, differentiation, integration, and convergence; introduction to differentiable manifolds. Prerequisite: MATH240. *Fall/Spring sequence*

MATH441, 442 ♦ Alt (3, 3)

Algebra

Study of groups, rings, fields, modules, vector spaces, and algebras. Prerequisites: MATH240. *Fall/Spring sequence*

MATH475 ♦ Alt (3)

Geometry

Intuitive background and outline of axiomatic development of Euclidean, non-Euclidean, affine, and projective spaces. Relation of these topics to secondary teaching. Prerequisite: MATH142. *Fall*

MATH487 Alt (1-3)

Special Topics in Mathematics

Consult the instructor in regard to the topic to be covered. Prerequisite: Consent of teacher. *Fall*

MATH495 (1-3)

Independent Study

Independent study of selected topics in mathematics to enable advanced students to pursue topics not offered in other scheduled courses. The student will study under the supervision of a mathematics teacher whose prior approval is required. Ordinarily a minimum of four hours of study per week is expected for each credit. Grades are assigned on the basis of a teacher-selected procedure such as oral or written exams or reports.

STATISTICS

STAT285 (3)

Elementary Statistics

A study of basic descriptive and inferential statistics, including

elementary probability and probability distributions, statistical inference involving binomial, normal, and t -distributions, and hypothesis testing. Prerequisite: MPE 2.0 *Fall, Spring*

STAT285 V (4)
Elementary Statistics
 Distance education—see content above.

STAT340 (3)
Probability Theory with Statistical Applications
 Basic concepts of probability theory and statistics for students having preparation in calculus and algebra and who desire a deeper understanding of the principles underlying statistical methods. Definitions of probability, random variables, probability distributions, estimators, and statistical decision theory. Prerequisite: MATH141 or 182. *Fall*

HONORS

MATH271-50 (1)
Honors in Mathematics
 The study of mathematical problems where the solution depends more on insight and creativity than on routine computation. Repeatable to 2 credits. Prerequisite: MATH142 and consent of instructor.

GRADUATE

MATH530 (2-3)
Topics in Teaching Mathematics
 A. Algebra
 B. Geometry
 C. Analysis
 D. Applications
 Consult with department chair regarding availability in any given year. Repeatable to 6 credits.

MATH540 Alt (2-3)
Topics in Mathematics
 Consult with the instructor in regard to the topic to be covered. Prerequisite: Consent of the instructor. Repeatable to 6 credits.

MATHEMATICS EDUCATION

The following courses are available only to participants in the Alternative Certification Experimental Program (Math Endorsement Program) for Middle School Educators, which is jointly administered by the Andrews University School of Education and the Berrien County Intermediate School District. Applications to this Program are initially screened by the School of Education and the Department of Mathematics, and then go through the regular Andrews admissions process. These courses will be taught in rotation, during the regular school year and during the summer, according to a schedule set by the Administrative Committee for the Program.

MAED505 (2)
Understanding Numbers and Operations for Middle Grades Educators
 This course is designed to strengthen middle school teachers' rational number knowledge and number sense. This includes the in-depth study of rational numbers and operations on rational numbers, the structure of the rational and real number systems, algorithms for computation, estimation strategies, and working with very large and very small numbers. The pedagogy of the course models that of effective middle school mathematics teachers.

MAED510 (3)
Exploring Algebra and Functions for Middle Grades Educators
 This course extends the middle school teachers' understanding of algebra as a symbolic language. This course moves beyond symbol manipulation to include modeling of physical situations. Students will explore algebraic, linear, and non-linear functions within the context of the course. The pedagogy of the course models that of effective middle school mathematics teachers.

MAED515 (3)
Data Analysis for Middle Grades Educators
 This course presents an integrated approach to data analysis, statistics, and probability for middle grades math teachers. Instruction focuses on specific real-world data sets and statistical investigations. The pedagogy of the course models that of effective middle school mathematics teachers.

MAED521 (2)
Informal Geometry and Measurement for Middle Grades Educators
 This course is the first of two which lead prospective mathematics teachers through a series of explorations to develop competence in geometric reasoning, including conjecture, proving, and disproving. Prospective teachers develop a deeper understanding of the role of proof in geometry. The pedagogy of this course models that of effective middle school mathematics teachers.

MAED522 (2)
Formal Geometry for Middle Grades Educators
 This course is the second of two which lead prospective mathematics teachers through a series of explorations to develop competence in geometric reasoning, including conjecturing, proving, and disproving. Prospective teachers refine their understanding of the role of proof in geometry. The pedagogy of the course models that of effective middle school mathematics teachers.

MAED600 (2)
Discrete Mathematics and Number Theory for Middle Grades Educators
 Students investigate concepts of number theory, discrete mathematics, and logic as they apply to middle grades mathematical education. Each topic includes a study of graphic representation of concepts and applications in technology. The pedagogy of the course models that of effective middle school mathematics teachers.

MAED610 (4)
Mathematical Modeling for Middle Grades Educators
 Investigation of concepts and practices of mathematical modeling with an emphasis on application to middle grades education. The pedagogy of the course models that of effective middle school mathematics teachers.

MAED625 (2)
Mathematical Investigations for Middle Grades Classrooms
 Participants investigate topics in mathematics, including probability, programming, fractals, and chaos theory. Emphasis is placed on participant understanding of these topics and their appropriate use as investigations with middle grades students. The pedagogy of the course models that of effective middle school mathematics teachers.