

# Mathematics (MATH)

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## Courses

### **MATH 111 Fundamentals of Mathematics\* (3 Hours)**

**Prerequisites:** AAC 112 with a grade of "C" or higher or appropriate score on the math placement test.

Fundamentals of Mathematics is designed for the student who needs to improve or review basic math skills and concepts. This course includes computation using integers, fractions, decimals, proportions and percents along with an overview of measurement, geometry, statistics and linear equations. Fundamentals of Math provides the mathematical foundation upon which subsequent studies in mathematics and other areas depend. This course is the first in a sequence of courses leading to MATH 116 or higher. 3 or 5 hrs. lecture/wk.

### **MATH 115 Elementary Algebra\* (3 Hours)**

**Prerequisites:** MATH 111 with a grade of "C" or higher or appropriate score on the math placement test.

This is a beginning course in algebra, designed to help students acquire a solid foundation in the basic skills of algebra. Students will learn to simplify arithmetic and algebraic expressions, including exponential expressions, polynomials, rational expressions and radical expressions; solve equations and inequalities, including linear equations and quadratic equations; graph linear equations; and analyze linear equations. This course is the first in a sequence of courses leading to MATH 116 or higher. 3 or 5 hrs. lecture/wk.

### **MATH 116 Intermediate Algebra\* (3 Hours)**

**Prerequisites:** MATH 115 with a grade of "C" or higher or appropriate score on the math placement test.

This course focuses on arithmetic and algebraic manipulation, equations and inequalities, graphs, and analysis of equations and graphs. Students will simplify arithmetic and algebraic expressions, including those containing rational expressions, rational exponents, radicals and complex numbers; solve equations and inequalities including linear, quadratic, quadratic in form, as well as those containing rational expressions, radicals or absolute value; graph linear inequalities; and analyze functions and non-functions. 3 or 5 hrs.lecture/wk.

### **MATH 118 Geometry\* (3 Hours)**

**Prerequisites:** MATH 115 with a grade of "C" or higher or appropriate score on the math placement test.

This course is an informal approach to geometry. Topics will include lines, polygons, area, volume, circles, similarity, congruence and coordinate geometry. 3 hrs. lecture/wk.

### **MATH 120 Business Mathematics\* (3 Hours)**

**Prerequisites:** MATH 111 with a grade of "C" or higher or appropriate score on the math placement test.

This is a course for the student who needs specific skills in mathematics to address business problems and business applications. Students will learn the mathematics involved in payroll, retailing, asset valuation, interest, finance, and the time value of money. Students will use a calculator and computer to solve a variety of applications. 3 hrs. lecture/wk.

### **MATH 130 Technical Mathematics I\* (3 Hours)**

**Prerequisites:** MATH 111 with a grade of "C" or higher or an appropriate score on the math placement test.

This course is the first of a two-semester sequence that will introduce the mathematical skills and concepts necessary in technical work. It will focus on the basics of algebra, geometry and their applications. Topics will include operations with polynomials, linear equations, systems of equations, formulas and basic geometry. 3 hrs. lecture/wk.

### **MATH 131 Technical Mathematics II\* (3 Hours)**

**Prerequisites:** MATH 130 with a grade of "C" or higher or an appropriate score on a placement test.

This course is the second of a two-semester sequence on the mathematical skills and concepts necessary in technical work. It will focus on more advanced algebraic skills, solving equations, and trigonometry. The topics will include polynomials, rational expressions, radical expressions, complex numbers, solving quadratic, rational, radical, exponential and logarithmic equations, and working with basic trigonometry. 3 hrs. lecture/wk.

### **MATH 165 Finite Mathematics\* (3 Hours)**

**Prerequisites:** MATH 116 with a grade of "C" or higher or appropriate score on the math placement test.

This course will emphasize the beauty, scope, practical applications and relevance of mathematics. It is designed to involve the students with the concepts as well as quantitative skills. Topics include set theory, symbolic logic, deductive reasoning, probability, statistics, mathematics of finance, systems of equations, matrix algebra and linear programming. 3 hrs. lecture/wk.

**MATH 171 College Algebra\* (3 Hours)** nbsp;

**Prerequisites:** MATH 116 with a grade of "C" or higher or appropriate score on the math placement test.

This course focuses on the study of functions and their graphs, techniques of solving equations and applications. Students will analyze and graph functions, including constant, linear, quadratic, piecewise-defined, absolute value, square root, polynomial, rational, exponential and logarithmic functions and non-functions; solve equations and inequalities, including polynomial equations, absolute value equations, radical equations, rational equations, exponential equations, logarithmic equations, systems of linear and non-linear equations and systems of linear inequalities; and apply functions in real-world situations. 3 or 5 hrs./wk.

**MATH 171H HON: College Algebra\* (1 Hour)**

**Prerequisites:** Honors department approval.

One-credit hour honors contract is available to qualified students who have an interest in a more thorough investigation of a topic related to this subject. An honors contract may incorporate research, a paper, or project and includes individual meetings with a faculty mentor. Student must be currently enrolled in the regular section of the courses or have completed it the previous semester. Contact the Honors Program Office, COM 201, for more information.

**MATH 172 Trigonometry\* (3 Hours)** nbsp;

**Prerequisites:** MATH 171 with a grade of "C" or higher or appropriate score on the math placement test.

This is a course in trigonometric functions and graphs. Emphasis will be on understanding function notation, definitions, algebraic relations, real-world applications, graphing in the real and complex plane, inverse functions, polar functions and vectors. 3 hrs. lecture/wk.

**MATH 172H HON: Trigonometry\* (1 Hour)**

**Prerequisites:** Honors department approval.

One-credit hour honors contract is available to qualified students who have an interest in a more thorough investigation of a topic related to this subject. An honors contract may incorporate research, a paper, or project and includes individual meetings with a faculty mentor. Student must be currently enrolled in the regular section of the courses or have completed it the previous semester. Contact the Honors Program Office, COM 201, for more information.

**MATH 173 Precalculus\* (5 Hours)**

**Prerequisites:** MATH 116 with a grade of "C" or higher or appropriate score on the math placement test.

Note: MATH 173 is an accelerated course recommended for students with a strong high school math background (three to four years) who plan to take calculus. This course focuses on the study of functions and their graphs, solving equations and inequalities, recognition and creation of patterns, and the use of mathematical models. Included in the course are linear, power, polynomial, rational, radical, exponential, logarithmic, trigonometric, and absolute value functions. 5 hrs. lecture/wk.

**MATH 173H HON: Precalculus\* (1 Hour)**

**Prerequisites:** Honors department approval.

One-credit hour honors contract is available to qualified students who have an interest in a more thorough investigation of a topic related to this subject. An honors contract may incorporate research, a paper, or project and includes individual meetings with a faculty mentor. Student must be currently enrolled in the regular section of the courses or have completed it the previous semester. Contact the Honors Program Office, COM 201, for more information.

**MATH 175 Discrete Mathematics and its Applications\* (3 Hours)**

**Prerequisites:** MATH 171 or MATH 173 with a grade of "C" or higher or appropriate score on the math placement test.

This course is designed to present the beauty, scope, practical applications and relevance of mathematics. It will focus on applications of general interest drawn primarily from the social and biological sciences and business. Topics will be placed in a historical context, and mathematical reasoning will be stressed. 3 hrs. lecture/wk.

**MATH 181 Statistics\* (3 Hours)** nbsp;

**Prerequisites:** MATH 171 or MATH 173 or an equivalent course with a grade of "C" or higher or appropriate score on the math placement test.

This is a beginning course in statistical analysis, the skill of making sense of raw data, constructing graphical representations of data, developing models for making predictions, performing tests to determine significant change and finding intervals for population values. Students will learn the basics of descriptive statistics, probability, sampling, confidence intervals, distributions, hypothesis testing, regression and correlation. Use of technology will be incorporated into course topics. 3 hrs. lecture/wk.

**MATH 181H HON: Statistics\* (1 Hour)**

**Prerequisites:** Honors department approval.

One-credit hour honors contract is available to qualified students who have an interest in a more thorough investigation of a topic related to this subject. An honors contract may incorporate research, a paper, or project and includes individual meetings with a faculty mentor. Student must be currently enrolled in the regular section of the courses or have completed it the previous semester. Contact the Honors Program Office, COM 201, for more information.

**MATH 191 Math and Physics for Games I\* (4 Hours)**

**Prerequisites:** MATH 171 or MATH 173 with a grade of "C" or higher or appropriate score on math placement test and GAME 121.

This introductory course focuses on the mathematics and physics concepts needed to program a variety of video game scenarios. Student will learn to use vectors and matrix transformations to model the motion of physical objects in two and three dimensions. Students will also learn various computer programming methods in order to model these mathematical and physical concepts. 3 hrs. lecture and 2 hrs. lab/wk.

**MATH 191H HON: Math and Physics for Games I\* (1 Hour)**

**Prerequisites:** Honors department approval.

One-credit hour honors contract is available to qualified students who have an interest in a more thorough investigation of a topic related to this subject. An honors contract may incorporate research, a paper, or project and includes individual meetings with a faculty mentor. Student must be currently enrolled in the regular section of the courses or have completed it the previous semester. Contact the Honors Program Office, COM 201, for more information.

**MATH 210 Mathematics for Elementary Teachers I\* (3 Hours)**

**Prerequisites:** MATH 171 or MATH 173 with a grade of "C" or higher or appropriate score on math placement test.

This is the first of a two-course sequence for prospective teachers of elementary and middle school mathematics. The focus of this course is an in-depth investigation of the mathematical principles and concepts encountered in grades K-8. Topics include set theory, numeration systems, number sense, critical thinking, and problem-solving strategies. The use of appropriate techniques and tools, such as calculators, computers and manipulatives, will be integrated throughout the course in order to enhance the depth of understanding. 3 hrs. lecture/wk.

**MATH 212 Math for Elementary Teachers II\* (3 Hours)**

**Prerequisites:** MATH 210 with a grade of "C" or higher or department approval.

This is the second of a two-course sequence for prospective teachers of elementary/middle school mathematics. The focus of this course is an in-depth investigation of the mathematical principles and concepts encountered in grades K-8. Topics include probability, statistics, measurement, and shapes including congruency, similarity, and transformations. The use of appropriate techniques and tools, such as calculators, computers, and manipulatives, will be integrated throughout the course in order to enhance the depth of understanding. 3 hrs. lecture/wk. NOTE: the prerequisite of MATH 210 requires a grade of "C" or higher.

**MATH 214 Introduction to Teaching Math and Science I\* (1 Hour)**

**Prerequisites:** MATH 171 with a grade of "C" or higher OR appropriate score on the math placement test OR department approval.

This course allows math and science students to explore and develop an appreciation for teaching as a career. To support their learning, students will be introduced to the theory and practice that is necessary to design and deliver quality instruction. They will plan and implement lessons of an inquiry-based curriculum in an elementary classroom during the semester. MATH 214, ASTR 214, BIOL 214, CHEM 214, GEOS 214, PHYS 214 and PSCI 214 are the same course; enroll in only one. 1.25 hrs. lecture/wk.

**MATH 215 Introduction to Teaching Math and Science II\* (1 Hour)**

**Prerequisites:** ASTR 214 or BIOL 214 or CHEM 214 or GEOS 214 or MATH 214 or PHYS 214 or PSCI 214 with a grade of "C" or higher.

Students learn about the middle school environment and work on math and science inquiry-based lesson analysis, design and assessment. Student partners will plan and teach three inquiry-based lessons in a middle school. The course emphasizes writing 5E lesson plans with a focus on the importance of using appropriate questioning and assessment strategies throughout the lesson, as well as how to analyze and modify a lesson based on personal reflections and observer feedback. By the completion of the course, students should be able to reflect on their personal suitability/interest in teaching secondary math or science, and develop a feasible pathway to a career in teaching. MATH 215, ASTR 215, BIOL 215, CHEM 215, GEOS 215, PHYS 215 and PSCI 215 are the same course; enroll in only one. 1.25 hrs. lecture/wk.

**MATH 231 Business and Applied Calculus I\* (3 Hours) nbsp;**

**Prerequisites:** MATH 171 or MATH 173 with a grade of "C" or higher or an appropriate score on a placement test.

This is the first course in calculus as it applies to business; the social, behavioral and biomedical sciences; and other fields. Concepts include measuring the slope of a curve, writing equations of tangent lines, finding maximum and minimum points, determining the rate of change of a function, and measuring the area under a curve. Algebraic skills and application problems are stressed. Specific calculus topics include finding limits; differentiation of algebraic, exponential and logarithmic functions; and integration of algebraic and exponential functions. Trigonometry (MATH 172) can be taken concurrently with MATH 231 for those students planning to enroll in MATH 232 in subsequent semesters. 3 hrs. lecture/wk.

**MATH 231H HON: Business and Applied Calculus I\* (1 Hour)**

**Prerequisites:** Honors department approval.

One-credit hour honors contract is available to qualified students who have an interest in a more thorough investigation of a topic related to this subject. An honors contract may incorporate research, a paper, or project and includes individual meetings with a faculty mentor. Student must be currently enrolled in the regular section of the courses or have completed it the previous semester. Contact the Honors Program Office, COM 201, for more information.

**MATH 232 Business and Applied Calculus II\* (3 Hours)**

**Prerequisites:** MATH 231 and either MATH 172 or MATH 173 with a grade of "C" or higher or appropriate score on the math placement test.

This is the second course in a two-semester series on calculus that covers five techniques of integration, differentiation and integration of trigonometric functions, differential equations, and functions of several variables as applied to business, statistics, biology and the social sciences. 3 hrs. lecture/wk.

**MATH 232H HON: Business and Applied Calculus II\* (1 Hour)**

**Prerequisites:** Honors department approval.

One-credit hour honors contract is available to qualified students who have an interest in a more thorough investigation of a topic related to this subject. An honors contract may incorporate research, a paper, or project and includes individual meetings with a faculty mentor. Student must be currently enrolled in the regular section of the courses or have completed it the previous semester. Contact the Honors Program Office, COM 201, for more information.

**MATH 241 Calculus I\* (5 Hours)**

**Prerequisites:** Either (MATH 171 and MATH 172 with a grade of "C" or higher) or MATH 173 with a grade of "C" or higher or an appropriate score on a placement test.

This is the first of a three-semester sequence on calculus designed for engineering, physics and math majors. Rates of change and areas will be studied. To accomplish this, the students will study and apply limits and continuity. Differentiation and integration of algebraic, trigonometric and transcendental functions will also be a major focus of this course. 5 hrs. lecture/wk.

**MATH 241H HON: Calculus I\* (1 Hour)**

**Prerequisites:** Honors department approval.

One-credit hour honors contract is available to qualified students who have an interest in a more thorough investigation of a topic related to this subject. An honors contract may incorporate research, a paper, or project and includes individual meetings with a faculty mentor. Student must be currently enrolled in the regular section of the courses or have completed it the previous semester. Contact the Honors Program Office, COM 201, for more information.

**MATH 242 Calculus II\* (5 Hours)**

**Prerequisites:** MATH 241 with a grade of "C" or higher.

This is the second course of a three-semester sequence on calculus. Integration is covered with an emphasis on analytical, numerical, and graphical methods. Techniques of integration are used to solve scientific and geometric applications. Infinite series are analyzed for convergence and applied to the representation of functions. 5 hrs. lecture/wk.

**MATH 242H HON: Calculus II\* (1 Hour)**

**Prerequisites:** Honors department approval.

One-credit hour honors contract is available to qualified students who have an interest in a more thorough investigation of a topic related to this subject. An honors contract may incorporate research, a paper, or project and includes individual meetings with a faculty mentor. Student must be currently enrolled in the regular section of the courses or have completed it the previous semester. Contact the Honors Program Office, COM 201, for more information.

**MATH 243 Calculus III\* (5 Hours)**

**Prerequisites:** MATH 242 with a grade of "C" or higher or an equivalent course with a grade of "C" or higher.

This is the third course in a three-semester sequence on analytic geometry and calculus. Topics include vector-valued functions, functions of several variables, multiple integration, and vector analysis. 5 hrs. lecture/wk.

**MATH 243H HON: Calculus III\* (1 Hour)**

**Prerequisites:** Honors department approval.

One-credit hour honors contract is available to qualified students who have an interest in a more thorough investigation of a topic related to this subject. An honors contract may incorporate research, a paper, or project and includes individual meetings with a faculty mentor. Student must be currently enrolled in the regular section of the courses or have completed it the previous semester. Contact the Honors Program Office, COM 201, for more information.

**MATH 246 Elementary Linear Algebra\* (3 Hours)**

**Prerequisites:** MATH 242 or an equivalent course with a grade of "C" or higher.

This sophomore-level introduction to linear algebra uses a matrix-oriented approach, with an emphasis on problem solving and applications. The course focus is on matrix arithmetic, systems of linear equations, properties of Euclidean n-space, eigenvalues and eigenvectors, orthogonality and vector spaces. Students are expected to use technology for matrix operations. 3 hrs. lecture/wk.

**MATH 246H HON: Elementary Linear Algebra\* (1 Hour)**

**Prerequisites:** Honors department approval.

One-credit hour honors contract is available to qualified students who have an interest in a more thorough investigation of a topic related to this subject. An honors contract may incorporate research, a paper, or project and includes individual meetings with a faculty mentor. Student must be currently enrolled in the regular section of the courses or have completed it the previous semester. Contact the Honors Program Office, COM 201, for more information.

**MATH 254 Differential Equations\* (4 Hours)**

**Prerequisites:** MATH 243 with a grade of "C" or higher or an equivalent course with a grade of "C" or higher.

This course will cover standard types of equations that involve rates of change. In particular, this is an introductory course in equations that involve ordinary derivatives. Both qualitative and quantitative approaches will be used. Standard types and methods will be covered, including Laplace transforms, infinite series, and numerical methods. Basic linear algebra will be developed to solve systems of differential equations. 4 hrs. lecture/wk.

**MATH 254H HON: Differential Equations\* (1 Hour)**

**Prerequisites:** Honors department approval.

One-credit hour honors contract is available to qualified students who have an interest in a more thorough investigation of a topic related to this subject. An honors contract may incorporate research, a paper, or project and includes individual meetings with a faculty mentor. Student must be currently enrolled in the regular section of the courses or have completed it the previous semester. Contact the Honors Program Office, COM 201, for more information.

**MATH 285 Statistics for Business\* (4 Hours)**

**Prerequisites:** MATH 231 or MATH 241 or an equivalent course with a grade of "C" or higher Note: Students transferring MATH 285 to the University of Kansas must have CIS 201 as a corequisite.

This is a beginning course in calculus-based statistical analysis with an emphasis on applications to business. The skill of making sense of raw data is important, and includes constructing graphical representations of data, developing models for making predictions, performing tests to determine significant change and finding intervals for population values. Students will learn the basics of descriptive statistics, probability, sampling, confidence intervals, hypothesis testing, linear regression, and an introduction to quality control. Students must have an understanding of calculus concepts in order to successfully complete this course. 4 hrs. lecture/wk. Students transferring MATH 285 to KU must have CIS 201 as a corequisite.

**MATH 292 Special Topics:\* (1-3 Hour)**

**Prerequisites:** Department approval.

MATH 292 allows students to investigate in-depth a single theme or topic in mathematics. This may be accomplished by expanding upon a subject introduced in current course offerings or exploring a subject not addressed in the curriculum of the mathematics department. Special Topics may be repeated for credit but only on different topics. Total contact hours vary with topic.