

MATHEMATICS (MATH)

Note: All entering freshmen and transfer students are required to take the university placement examination in mathematics. These students may not register for any mathematics or computer science course until they have taken the examination. Students may not use MATH 090, 095, or 098 toward satisfying general education mathematics or university graduation requirements.

Students enrolling in MATH classes must receive at least a grade of C in all prerequisite mathematics and computer science courses.

090 BASIC MATHEMATICS /4 (3)

Fundamental operations on whole numbers, decimals, and fractions. Conversions among numerals. Percent problems. Applications using proportions. Area and volume. Credit does not count toward graduation.

091 ILLINOIS TEACHER CERTIFICATION REVIEW OF BASIC SKILLS IN MATHEMATICS (1)

Prerequisites: Completion of mathematics requirements in the student's major, or consent of department

Review of mathematics concepts, skills, and problem solving to prepare the basic skills mathematics portion of the state teacher certification examination. May be repeated. Credit may not be used toward graduation.

092 ILLINOIS MATHEMATICS TEACHER CERTIFICATION REVIEW (1)

Co-requisite: MATH 363 or consent of the department.

Review of mathematics concepts and problem solving to prepare for state teacher certification examination. May be repeated. Credit does not count toward graduation.

095 BASIC ALGEBRA /4 (3)

Prerequisite: MATH 090 or by placement examination.

Fundamental operations on signed numbers and polynomials. Factoring and simplifying algebraic expressions; solving and graphing linear equations in one and two variables. Credit does not count toward graduation. Graphing calculator required.

098 INTERMEDIATE ALGEBRA /4 (3)

Prerequisite: MATH 095 or by placement examination.

Signed numbers, linear equations, polynomials, quadratic equations, graphs of lines and quadratics, functions, rational expressions, rational exponents, systems of linear equations. Credit does not count toward graduation. Graphing calculator required.

121 INTRODUCTION TO MATHEMATICAL THOUGHT (3)

Prerequisite: MATH 098 or 160 or 161 or by placement examination.

Mathematical reasoning and solving real world problems. In depth study of three or four of the following topics: geometry, counting techniques and probability, graph theory, logic/set theory, mathematical modeling, game theory, and linear programming. Graphing calculator required.
IAI: M1 904

123 QUANTITATIVE LITERACY (3)

Prerequisite: MATH 098 or 160 or 161 or by placement examination; READ 150.

Develops conceptual understanding for problem solving and decision making; uses analytic skills including statistical measures, graphs of functions, estimation, and selection and use of appropriate approaches for formulating and solving real world problems. Graphing calculator required. May be taken before or after MATH 121. IAI: M1 901

140 CONCEPTS OF MATHEMATICS FOR ELEMENTARY SCHOOL TEACHERS I /4 (3)

Prerequisite: MATH 098 or by placement examination; READ 150. Co-requisite: ENG 128.

Patterns and problem solving, numeration systems, functions, algorithms for whole numbers, integer, decimal, and rational number operations (addition, subtraction, multiplication, division), divisibility tests, GCD, LCM, ratio and proportion, percents, statistical graphs, measures of central tendency and variation. Credit not given for both Math 139 and 140. IAI: M1 903

141 CONCEPTS OF MATHEMATICS FOR ELEMENTARY SCHOOL TEACHERS II /4 (3)

Prerequisite: MATH 140.

Points, lines, planes, curves, angles, three-dimensional figures, congruence, similarity, construction, English system, metric system, perimeter, area, volume, Pythagorean theorem, probability. IAI: M1 903

162 COLLEGE ALGEBRA /4 (3)

Prerequisite: MATH 098 or 160 or 161 or by placement examination.

Equations and inequalities, rectangular coordinates, lines, functions and their graphs, polynomials and rational functions, exponential and logarithmic functions, and systems of equations. Graphing calculator required.

163 COLLEGE ALGEBRA AND TRIGONOMETRY /4 (3)

Prerequisite: MATH 162 or by placement examination.

Exponential and logarithmic functions, systems of equations, trigonometric functions, solution of triangles, mathematical induction, sequences, polar coordinates, and conics. Graphing calculator required.

171 PRECALCULUS MATHEMATICS /6 (5)

Prerequisite: MATH 098 or consent of the department.

Sets; real numbers; theory and application of functions and inverse functions; trigonometric functions; complex numbers; exponentials and logarithms; matrices and determinants; vectors. Graphing calculator required.

180 INTRODUCTION TO MATHEMATIC PROFESSIONS (1)

Prerequisite: MATH 163

A survey of career opportunities for mathematics professionals in industry, government, and education. Overview of the skills, training, strategies, and education required for the various occupations and mathematics curricula. Introduction to the resources available to aid the mathematics major. May not be used to fulfill general education requirements.

201 LINEAR ALGEBRA (3)

Prerequisite: MATH 163 or 171 or by placement examination.

Matrices and vectors; transformations and matrices; matrix and vector products; determinants; applications. Graphing calculator required.

209 BASIC CALCULUS (3)

Prerequisite: MATH 162 or 171 or by placement examination.

Functions and limits; the derivative and its applications; the integral and its applications. Graphing calculator required.

IAI: M1 900

210 BASIC PROBABILITY AND STATISTICS (3)

Prerequisite: Math 162 or 171 or by placement examination.

Sample spaces; set functions; probability; random variables; probability distributions; mean, median, and standard deviations; sampling; hypothesis testing; tests concerning means. Graphing calculator required. IAI: M1 902

214 INTRODUCTION TO FINITE MATHEMATICS (3)

Prerequisite: MATH 162 or 171 or by placement examination.

Probability; model building; linear programming; matrices. Emphasis on applications in business and social science. Graphing calculator required. IAI: M1 906

261 CALCULUS I (4)

Prerequisite: MATH 163 or MATH 171 or by placement examination.

Limits and continuity, derivatives of algebraic and trigonometric functions, chain rule, applications (such as extreme problems, related rates, graphing), antiderivatives, definite integral, applications (such as area, volume, work, force). Graphing calculator required. IAI: M1 900, EGR 901, MTH 901.

262 CALCULUS II (4)

Prerequisite: MATH 261 or by placement examination; MATH 180 (or concurrent enrollment).

Calculus of the exponential, logarithmic, and trigonometric functions, techniques of integration, l'Hopital's rule, improper integrals, infinite series, and polar coordinates. Graphing calculator required. IAI: M1 900, EGR 902, MTH 902

263 CALCULUS III (4)

Prerequisite: MATH 262.

Parametric equations, vectors and vector functions, calculus of functions of several variables, gradients, multiple integrals, line integrals, Green's theorem. Graphing calculator required. IAI: M1 900, EGR 903, MTH 903.

271 DIFFERENTIAL EQUATIONS (4)

Prerequisite: MATH 263.

First order differential equations with applications; numerical methods, linear differential equations with applications, power series, and Laplace transforms. IAI: EGR 904 MTH 912

274 REVIEW FOR ACTUARIAL EXAMINATION 100 /3 (2)

Prerequisite: Grade of C or better in MATH 201, 261, 262, 263, and 271.

Specifically designed for preparation for Actuarial Examination 100. Emphasis on problem solving. Practice examinations.

283 DISCRETE MATHEMATICS (3)

Prerequisite: CPTR 141 and MATH 162 or 171

Relations, functions, permutations, combinations, sets, logic, Boolean algebra, graph theory. Credit is given for only one of the following: MATH 300, MATH 303, or MATH 283. IAI: M1 905, CS 915.

304 NUMBER THEORY FOR MIDDLE SCHOOL TEACHERS (3)

Prerequisite: MATH 141 or MATH 162 or equivalent and a 200-level mathematics course.

Prime numbers. Euclidean algorithm. Greatest common divisors and least common multiples. Modular arithmetic. Diophantine equations. Integration of the content in elementary and middle school. May not be used for graduation credit in mathematics or mathematics secondary education options.

305 GEOMETRY FOR MIDDLE SCHOOL TEACHERS (3)

Prerequisite: MATH 141 or MATH 162 or equivalent; and a 200-level mathematics course

Incidence relation, angles, congruence, measurement, compass-and-straightedge constructions, circles, similarity, right-triangle trigonometry, area, volume, coordinate geometry in two and three dimensions, polygons, arcs and arc length. Integration of content in the elementary and middle school. May not be used for graduation credit in mathematics or mathematics secondary education options.

306 MODERN ALGEBRA FOR MIDDLE SCHOOL TEACHERS (3)

Prerequisite: MATH 141 or equivalent.

An introduction to modern algebra. Topics chosen from: groups, rings, fields and their applications. May not be used for graduation credit in mathematics or mathematics secondary education options.

307 HISTORY OF MATHEMATICS FOR MIDDLE SCHOOL TEACHERS (3)

Prerequisites: Math 209 and Math 305 or equivalent

The historical basis of numeration, operations, geometry, algebra, trigonometry and calculus. The cultural aspect of mathematics and its contributions to knowledge and learning. Integration of content in the elementary and middle school. May not be used for graduation credit in mathematics or mathematics secondary education options.

308 MATRICES AND LINEAR TRANSFORMATIONS (3)

Prerequisite: MATH 201 and 262.

Vector spaces, bases, dimensionality, linear transformations, determinants, matrices, matrix inversion, rank, equivalence.

313 THEORY OF INTEREST (3)

Prerequisite: MATH 262

Measure of interest, accumulated and present value factors, annuities certain, yield rates, amortization schedules and sinking funds, bonds and related securities. Spread sheets used.

315 INTRODUCTION TO STATISTICS LECTURE AND LABORATORY /5 (4)

Prerequisite: MATH 262.

Descriptive statistics, discrete and continuous random variables, expectation, distribution functions, central limit theorem, point estimation, confidence intervals, and hypothesis testing. SAS Laboratory. Credit will not be given for both MATH 315 and MATH 317. Additional course fee.

318 PROBABILITY AND MATHEMATICAL STATISTICS (3)

Prerequisite: MATH 263 and 315.

Moment generating functions, transformations of random variables, Bayes Theorem, sufficiency, likelihood estimators, Chi-square tests, regressions and contingency tables. SAS used.

325 LINEAR PROGRAMMING (3)

Prerequisite: MATH 201 or 214.

Linear equations, problem formulation, simplex method, duality theory, post-optimal analysis, transportation problem, game theory.

326 INTRODUCTION TO OPERATIONS RESEARCH (3)

Prerequisite: MATH 201 or 214; and MATH 209 or 261.

Linear programming, game theory, dynamic programming, graph theory and Markov chains. Emphasis on applications in business, industry, and behavioral sciences.

327 ELEMENTARY NUMBER THEORY (3)

Prerequisite: MATH 261.

Properties of integers, divisibility, greatest common divisors, primes, congruences, Diophantine equations, arithmetic functions, quadratic residues.

329 MATHEMATICAL LOGIC (3)

Prerequisite: MATH 261 or consent of the department.

A formal study of the propositional calculus and the predicate calculus, including formal semantics and axiomatizations. Completeness theorems for both systems will be proven.

342 GEOMETRY (3)

Prerequisite: MATH 261; and one unit of high school plane geometry (regular or honors) with a grade of C or higher, or MATH 305, or equivalent.

Incidence geometry, distances, measure, congruences, inequalities, parallel postulate, perpendicular lines and planes, similar triangles, polygons, circles and spheres, construction with ruler and compass. Writing emphasis course.

345 HISTORY OF MATHEMATICS (3)

Prerequisite: MATH 262 and 342, or equivalent.

Chronological survey of the growth and contributions of mathematics to knowledge and learning. Credit not given for both Math 320 and 345.

354 NUMERICAL ANALYSIS I (3)

Prerequisite: MATH 263.

Solution of linear systems by direct and iterative methods, matrix inversion, evaluation of determinants, characteristic values and vectors of matrices, application of boundary value problems in ordinary differential equations, numerical solution of partial differential equations.

355 NUMERICAL ANALYSIS II (3)

Prerequisite: MATH 354.

Continuation of mathematics 354.

356 INTRODUCTION TO COMPLEX VARIABLES (3)

Prerequisite: MATH 263.

Complex numbers and complex space, differentiation and integration of elementary functions, infinite series, Taylor and Laurent expansions, Cauchy's theorems and applications.

358 INTRODUCTION TO REAL VARIABLES (3)

Prerequisite: MATH 263.

Real numbers, real functions, limits, continuity, uniform continuity, differentiability, mean value theorems, theory of the Riemann integral.

361 INTRODUCTION TO MODERN ALGEBRA I (3)

Prerequisite: MATH 262.

Groups, rings, and fields.

**363 TEACHING MATHEMATICS IN
SECONDARY SCHOOLS (GRADES 6 - 12) /
FIELD (3)**

Co-requisite: MATH 092. Prerequisite: 201, 263, 342; admission to College of Education; ELCF 353 and READ 306 (or concurrent enrollment in ELCF 353 and READ 306); consent of the department.

Methods of teaching mathematics in high school grades 9-12 and middle school grades 6-8. Thirty hours of tutoring middle grade and high school grade students. May not be used toward mathematics requirements for a major or minor in mathematics. Credit will not be given for both Math 218 and Math 363.

370 SPECIAL TOPICS IN MATHEMATICS (1-3)

Prerequisite: To be determined by instructor and consent of the department.

Topics of current mathematical interest. May be repeated for credit if different topics are presented.

**375 STUDENT TEACHING AND SEMINAR -
SECONDARY LEVEL /FIELD (6)**

Prerequisite: Admission to the College of Education; ELCF 353; READ 306; MATH 201, 342; 363; a 2.5 grade point average in all coursework in the approved program; consent of the department; and a passing score on the subject matter/content area certification test within the last five years.

Off-campus placement in secondary schools in two or more grade levels. University and cooperating school supervision. Five full days including seminar for 16 weeks. No other courses may be taken during the semester of student teaching. May not be used to satisfy mathematics requirements for a major or minor in mathematics. Credit will not be given for both 275 and 375.

381 MATHEMATICS INTERNSHIP (3-6)

Prerequisite: Grade of C or higher in three 300-level mathematics courses earned 80 semester hours toward a baccalaureate degree, and a major in mathematics; or consent of the department.

A student project or activity in a mathematics environment outside the department where the techniques of mathematics are applied in an essential way. Activity to be performed must be approved in advance by the department. A written final report is required. Course may be repeated for a total of up to nine semester hours.

392 MATHEMATICS SEMINAR (3)

Prerequisite: MATH 263 and nine credit hours of mathematics courses numbered 308 or above.

Investigation of mathematical models in fields such as natural sciences, social sciences, business and engineering. Scientific calculators, graphing calculators, and current computer software will be used. Specific topics will vary. Writing emphasis course.