

Curriculum for BS in Mathematics - West Virginia State University

(As of Feb. 18, 2016)

MATH 020. FUNDAMENTALS OF ALGEBRA (3 credit hours) Real Numbers and their operations, algebraic expressions, integer components, polynomial arithmetic and factorization, linear equations and inequalities, quadratic equations, lines, systems of linear equations, applications. Prerequisite: ACT Math 15-18 or equivalent.

MATH 102. PLANE TRIGONOMETRY (3 credit hours) Trigonometry functions and graphs, identities and equations, solving triangles, vectors, polar coordinates, De Moivre 's Theorem. Prerequisite: MATH 120 or ACT Math score of 23 or above or permission of instructor.

MATH 103. PROBLEM SOLVING AND NUMBER SENSE (3 credit hours) Estimation, problem solving, sets, whole and rational number operations and properties, the set of integers, elementary number theory. Prerequisite: Eligibility for MATH 120.

MATH 104. ALGEBRA, STATISTICS, AND PROBABILITY (3 credit hours) Rational numbers, percent, probability, statistics, algebraic methods and problem solving, with reference to the NCTM standards. Prerequisite: MATH 103.

MATH 105. GEOMETRY AND MEASUREMENT (3 credit hours) Geometry, measurement, transformations, coordinates, with reference to the NCTM standards. Prerequisite: MATH 103.

MATH 111. MATHEMATICS FOR LIBERAL ARTS (3 credit hours) Problem solving, number systems, logic, consumer math, basic algebra and geometry, basic probability and statistics. Prerequisite: "C" or better in MATH 020 or ACT Math score of 19-22, or by placement test when appropriate.

MATH 120. COLLEGE ALGEBRA (3 credit hours) Equations and inequalities, functions, systems of equations and inequalities, graphing, rational expressions, radical expressions, and applications of the above. Prerequisite: ACT Math Score of 19 or above, or by placement test, or equivalent.

MATH 121. PRECALCULUS (4 credit hours) Properties and applications of algebraic and transcendental functions, angles, trigonometric ratios and identities, conic sections, polar coordinates, systems of equations, matrices. Prerequisite: "C" or better in MATH 120, or ACT Math score of 23 or above, or by placement test when appropriate.

MATH 205. DISCRETE MATHEMATICS (3 credit hours) The basic non-calculus mathematics for computer science in the areas of algebra, logic, combinations, and graph theory. Prerequisites: MATH 120 and CS101.

206. ANALYTIC GEOMETRY AND CALCULUS I (4 credit hours) One and two dimensional analytic geometry, functions, limits, continuity, the derivative and its applications, maxima and minima, concavity, Newton's Method, integration, area, Fundamental Theorem of Calculus, numerical integration, transcendental functions. Prerequisites: MATH 121 or both MATH 120 and MATH 102.

MATH 207. ANALYTIC GEOMETRY AND CALCULUS II (4 credit hours) Applications of integration, techniques of integration, improper integrals, sequences and series, Taylor's series, parametric equations, polar coordinates, conic sections. Prerequisite: MATH 206.

MATH 208. ANALYTIC GEOMETRY AND CALCULUS III (4 credit hours) Vectors, lines and planes in space, quadric surfaces, cylindrical and spherical coordinates, vector calculus, multivariable functions, partial differentiation and gradients, constrained and unconstrained optimization, double and triple integrals, volume, centroids, moments of inertia, line integrals. Prerequisite: MATH 207.

MATH 222. ELEMENTARY STATISTICS FOR MATH AND NATURAL SCIENCE (3 credit hours) Descriptive statistics, probability distributions, experiment design and sampling, confidence intervals, hypothesis testing. (Statistical software packages will be used) Prerequisite: "C" or better in MATH 120 or equivalent, or permission of instructor.

MATH 299. SPECIAL TOPICS (1-3 credit hours) Televised courses or other courses designed for special purposes.

MATH 300. INTRODUCTION TO COLLEGE GEOMETRY (3 credit hours) Advanced topics in the geometry of triangles, transformations (dilatations, similitude, inversion), foundations of geometry, theorems of Ceva and Menelaus, Desargues' configuration and duality. Prerequisite: MATH 206.

MATH 307. LINEAR ALGEBRA (3 credit hours) Vector spaces, linear transformations, inner products, orthonormality, eigenvalue problems, system of linear equations, matrices, determinants; application. Prerequisite: MATH 207.

MATH 308. INTRODUCTION TO MODERN ABSTRACT ALGEBRA (3 credit hours) Axiomatic development of rings, integral domains, fields, polynomials, complex numbers, group theory Boolean algebra, isomorphism. Prerequisite: MATH 208.

MATH 309. Introduction to the History of Mathematics (3 credit hours) The history of mathematics from the earliest times until the 18th century, as developed in Egypt, India, China, Greece, and Europe. Prerequisite: MATH 205 and 207.

MATH 310. ELEMENTARY NUMBER THEORY (3 credit hours) Induction, well-ordering principle, Euclidean Algorithm, Chinese Remainder Theorem, Fermat's and Wilson's Theorems, prime numbers, multiplicative functions, quadratic reciprocity, sum of squares, Diophantine Equations, Fermat's Last Theorem, cryptology. Prerequisite: MATH 205 and MATH 207.

MATH 315. INTRODUCTION TO COMPLEX VARIABLES (3 credit hours) Limits, continuity and differentiation of complex variable functions, analytic functions, Cauchy-Riemann equations, integration, contours, Cauchy's Integral Formula, Taylor series and Cauchy's Residue Theorem. Prerequisite: MATH 208.

MATH 317. MATHEMATICS FOR TEACHING (3 credit hours) Materials and methods for teaching mathematics in elementary school. Prerequisites: EDUC 316 and MATH 104 and MATH 105.

MATH 399. SPECIAL TOPICS (1-3 credit hours) A junior level course designed for a topic of special current interest, including televised courses. Prerequisite: As stated for each offering.

MATH 401. INTRODUCTION TO VECTOR ANALYSIS (3 credit hours) Vector algebra, derivatives, space curves, line and surface integrals, transformation of coordinates, directional derivative, divergence and Stokes' theorem; applications. Prerequisite: MATH 208.

MATH 402. DIFFERENTIAL EQUATIONS I (3 credit hours) The types and solutions of differential equations of the first and second order. Solutions of differential equations and the application of physics and mechanics. Prerequisite: MATH 208.

MATH 403. INTRODUCTION TO PROBABILITY (3 credit hours) Discrete and continuous probability models, random variables, estimation of parameters, moments, conditional probability, independence, central limit theorem, sampling distributions. Prerequisite: MATH 208 and MATH 222.

MATH 404. NUMERICAL ANALYSIS (3 credit hours) Numerical solution of linear and non-linear algebraic equations and eigenvalue problems, curve fitting, interpolation theory, numerical integration, differentiation and solution of differential equations, algorithms and computer programming. Prerequisites: MATH 208 and one programming language.

MATH 405. DIFFERENTIAL EQUATIONS II (3 credit hours) La place transform, series solutions, Bessel and Legendre equations, systems of equations, existence theorems, and numerical methods. Prerequisite: MATH 402.

MATH 406. MATHEMATICS STATISTICS (3 credit hours) Decision theory, confidence intervals, hypothesis testing, multiple linear regression, correlations, analysis of variance, covariance, goodness of fit tests, non-parametric tests. Prerequisites: MATH 403.

MATH 407. INTRODUCTION TO TOPOLOGY (3 credit hours) Set theory, cardinal numbers, orderings, continuity, homeomorphisms, convergence, separation, compactness, connectedness, completeness; topological, metric, regular, normal and Hausdorff spaces. Prerequisite: MATH 208.

MATH 408. SENIOR MATHEMATICS SEMINAR (1 credit hour) Integrates the work completed in the various courses. Reading and research oriented. (To be taken in one of the last two semesters prior to graduation.)

MATH 409. ADVANCED CALCULUS I (3 credit hour) Functions of several variables, vector functions, gradient, partial differentiation, directional derivative, multiple integrals, maxima and minima, improper integrals, line and surface integrals, divergences and Stokes' theorem. Prerequisite: MATH 208.

MATH 410. ADVANCED CALCULUS II (3 credit hours) Convergence of infinite series, uniform convergence, Taylor's series, Fourier series, ordinary and partial differential equations; functions of a complex variable including integrals, power series, residues and poles, conformal mapping. Prerequisite: MATH 409.

MATH 411. TEACHING OF MATHEMATICS IN SECONDARY AND MIDDLE SCHOOLS (3 credit hours) Review of the fundamental operations as applied to integers, fractions, and decimals; objective, methods and materials of instruction of mathematics, lesson and unit planning, classroom procedure in teaching mathematics, and use of mathematics laboratory. Prerequisite: EDUC 316, MATH 205, and MATH 300.