

DIVISION OF MATHEMATICS

Web Site: <https://twu.edu/mathematics/>

Division Lead: Brandi Falley, Ph.D.

Phone: 940-898-2166

Fax: 940-898-2179

E-Mail: mathcs@twu.edu

The Division of Mathematics offers programs leading to the degrees of Bachelor of Arts, Bachelor of Science, Master of Science, and Master of Science in Mathematics Teaching.

The baccalaureate program is intended to prepare the student for further work in mathematics at the graduate level, for teaching at the middle and high school levels, for employment as a mathematician or statistician, or for employment in a mathematics-related area in industry or government.

Undergraduate Degrees Offered

- B.S. in Mathematics (<http://catalog.twu.edu/undergraduate/arts-sciences/mathematics/mathematics-bs/>)
- B.A. in Mathematics (4-8 Mathematics Certification) (<http://catalog.twu.edu/undergraduate/arts-sciences/mathematics/math-4-8-certification-ba/>)
- B.S. in Mathematics (4-8 Mathematics Certification) (<http://catalog.twu.edu/undergraduate/arts-sciences/mathematics/math-4-8-certification/>)
- B.A. in Mathematics (7-12 Mathematics Certification) (<http://catalog.twu.edu/undergraduate/arts-sciences/mathematics/mathematics-ba-7-12-mathematics-certification/>)
- B.S. in Mathematics (7-12 Mathematics Certification) (<http://catalog.twu.edu/undergraduate/arts-sciences/mathematics/mathematics-bs-7-12-mathematics-certification/>)

Special Requirements

A Mathematics major requires a minor of at least 18 semester credit hours of which a minimum of 6 semester credit hours must be upper-division. Students may choose a minor from any offered at the university. For students seeking teacher certification, the required education courses will be taken in lieu of a minor.

Only courses in which a grade of C or higher is received may be counted as part of a Mathematics major or minor.

Teacher Certification

The department offers teacher certification in Mathematics at both the 4-8 and 7-12 levels. Students should contact the lead of Mathematics for details or check the department web pages for more information.

Engineering – A Special Opportunity for TWU Students

In collaboration with the University of North Texas (UNT), TWU provides a dual-degree option enabling students to attend the two universities simultaneously and graduate with a B.S. in Mathematics degree from TWU and a B.S. in Engineering degree (Electrical, Mechanical and Energy, Biomedical, or Materials Science) from UNT. Scholarships are available for qualified applicants.

For information about these engineering options, contact the department, or visit our website (<https://twu.edu/mathematics/>).

Admissions

All applicants must meet the general undergraduate admission requirements (<http://catalog.twu.edu/undergraduate/admission-information/>). The following degrees have additional secondary admission criteria:

- B.A. in Mathematics (4-8 Mathematics Certification) (<http://catalog.twu.edu/undergraduate/arts-sciences/mathematics/math-4-8-certification-ba/>)
- B.S. in Mathematics (4-8 Mathematics Certification) (<http://catalog.twu.edu/undergraduate/arts-sciences/mathematics/math-4-8-certification/>)
- B.A. in Mathematics (7-12 Mathematics Certification) (<http://catalog.twu.edu/undergraduate/arts-sciences/mathematics/mathematics-ba-7-12-mathematics-certification/>)
- B.S. in Mathematics (7-12 Mathematics Certification) (<http://catalog.twu.edu/undergraduate/arts-sciences/mathematics/mathematics-bs-7-12-mathematics-certification/>)

Faculty

*FALLEY, BRANDI N., Associate Professor of Mathematics; Division Lead of Mathematics, B.A., Ouachita Baptist University; M.S., Baylor University; Ph.D., Baylor University

*GRIGORIEVA, ELLINA, Professor of Mathematics, B.S., Lomonosov Moscow State University, Russia; M.S., Lomonosov Moscow State University, Russia; Ph.D., Lomonosov Moscow State University, Russia

*HAMNER, MARK S., Professor of Mathematics; Vice Provost of Institutional Research and Improvement, B.A., University of Texas at Austin; M.S., Baylor University; Ph.D., Baylor University

*MALLAM, WINIFRED A., Professor of Mathematics, B.A., Shaw University; M.S.S.E., Texas Woman's University; Ph.D., University of Jos, Nigeria

*NAVARRA-MADSEN, JUNALYN, Professor of Mathematics, B.S.Ed., University of St. La Salle; M.S., University of Texas at Dallas; Ph.D., University of Texas at Dallas

*SIDES, RYAN, Assistant Professor of Mathematics, B.S., East Texas Baptist University; M.S., Sam Houston State University; Ph.D., Baylor University

*SMITH, SHAWNDA, Assistant Professor of Mathematics, B.A., University of Texas at Austin; M.A., University of Texas at Austin; Ph.D., Texas State University

*WHEELER, ANN M., Professor of Mathematics, B.S., Henderson State University; M.S.E., Henderson State University; Ph.D., University of Northern Colorado

Asterisk (*) denotes Graduate Faculty status.

Courses

Courses

MATH 1013. Financial and Quantitative Literacy. (TCCN MATH 1332)

Develops analytic reasoning and the ability to solve quantitative problems. Topics covered chosen from logic and problem solving, quantitative information, financial management, probability and statistics, and other applications of mathematics. Satisfies three hours Mathematics Core (20) or Component Area Option (91). Prerequisite: Satisfactory score on mathematics placement test. Three lecture hours a week. Credit: Three hours.

MATH 1023. Introduction to Mathematics. Topics from algebra, geometry, and mathematical modeling. Satisfies three hours Mathematics Core (20) or Component Area Option (91). Prerequisite: Satisfactory score on Mathematics Placement Test. Three lecture hours a week. Credit: Three hours.

MATH 1113. Fundamentals of Algebra. May not be used to satisfy any mathematics requirement and hours earned will not count toward any graduation requirement. May not be used for credit on any degree. Basic algebraic operations, linear equations and inequalities, polynomials, rational expressions, factoring, exponents, radicals, and quadratic equations. Prerequisite: Three lecture hours a week. Credit: Three hours.

MATH 1123. Transition to College Mathematics. May not be used to satisfy any mathematics requirement and hours earned will not count toward any graduation requirement. May not be used for credit on any degree. Review or introduce operations involving rational numbers and decimals, exponents, linear equations in one and two variables, graphing, polynomial arithmetic and factoring, quadratic equations, linear inequalities in one and two variables, rational expressions, measurement geometry. Prerequisite: Satisfactory score on Mathematics Placement Test or successful completion of MATH 1113. Three lecture hours a week. Credit: Three hours.

MATH 1303. Elementary Analysis I. (TCCN MATH 1314) College algebra with some attention to rigor; elements of set theory; exponential and logarithmic functions. Satisfies three hours Mathematics Core (20) or Component Area Option (91). Prerequisite: Satisfactory score on Mathematics Placement Test. Three lecture hours a week. Credit: Three hours.

MATH 1313. Elementary Analysis II. (TCCN MATH 1316) Algebraic, exponential, logarithmic, and trigonometric functions; an introduction to matrix algebra; complex numbers, sequences, the binomial theorem. Satisfies three hours Mathematics Core (20) or Component Area Option (91). Prerequisite: Completion of high school algebra. Three lecture hours a week. Credit: Three hours.

MATH 1523. Mathematics Concepts I. (TCCN MATH 1350) Selected topics for EC - 2 grades from Real Number Systems; fundamental operations of mathematics, algebraic thinking, geometry, measurement, data analysis, statistics, and personal financial literacy. Satisfies the mathematics requirement only for those seeking EC - 6 certification. Prerequisite: MATH 1013, MATH 1023, MATH 1303, MATH 1313, MATH 1703, MATH 1713, or MATH 2014. Three lecture hours a week. Credit: Three hours.

MATH 1533. Mathematics Concepts II. (TCCN MATH 1351) Selected topics from Real Number Systems; fundamental operations of mathematics, algebraic thinking, geometry, measurement, data analysis, and personal financial literacy for Grades 3-5. Satisfies the mathematics requirement only for those seeking EC - 6 and 4-8 certification. Prerequisite: MATH 1013, MATH 1023, MATH 1303, MATH 1313, MATH 1703, MATH 1713, or MATH 2014. Three lecture hours a week. Credit: Three hours.

MATH 1543. Mathematics Concepts III. Selected topics for grades 6-8 from real number systems, fundamental operations of mathematics, algebraic thinking, geometry, measurement, data analysis, statistics, and personal financial literacy. Satisfies the mathematics requirement only for those seeking EC-6 and 4-8 certification. Prerequisite: MATH 1013, MATH 1023, MATH 1303, MATH 1313, MATH 1703, MATH 1713, or MATH 2014. Three lecture hours a week. Credit: Three hours.

MATH 1703. Elementary Statistics I. (TCCN MATH 1342) Frequency distributions; graphical representation, measures of central tendency, and dispersion; normal curve; hypothesis testing confidence intervals. Satisfies three hours Mathematics Core (20) or Component Area Option (91). Prerequisite: Satisfactory score on Mathematics Placement Test. Three lecture hours a week. Credit: Three hours.

MATH 1713. Elementary Statistics II. Traditional statistical concepts including descriptive statistics, binomial and normal probability models, tests of hypotheses, linear correlation and regression, two-way contingency tables, and one-way analysis of variance. Satisfies three hours Mathematics Core (20) or Component Area Option (91). Prerequisite: MATH 1703. Three lecture hours a week. Credit: Three hours.

MATH 2014. Calculus I. (TCCN MATH 2413) Analytic geometry; limits and continuity; differentiation of algebraic and transcendental functions; antiderivatives; definite integrals. Satisfies three hours Mathematics Core (20) or Component Area Option (91). Prerequisites: MATH 1303 and MATH 1313, or equivalent. Four lecture hours a week. Credit: Four hours.

MATH 2024. Calculus II. (TCCN MATH 2414) Differential equations; formal integration; applications of integration; improper integrals; infinite series; parametric functions. Prerequisite: MATH 2014. Four lecture hours a week. Credit: Four hours.

MATH 2053. Women and Minorities in Engineering, Mathematics, and Science. Examines reasons why women and minorities are traditionally underrepresented in the areas of engineering, mathematics, and science and includes strategies for increasing their representation. Introduction to problem-solving strategies, useful for any discipline, which emphasize solutions incorporating both current and emerging technologies. Satisfies three hours Core Component Area Option (90). Satisfies Global Perspectives graduation requirement. Prerequisite: Three hours of core math. Three lecture hours a week. Credit: Three hours.

MATH 2203. Business Analysis I. (TCCN MATH 1324) Algebraic functions, logarithmic functions, exponential functions, matrices and linear systems, and linear programming. Satisfies three hours Mathematics Core (20) or Component Area Option (91). Prerequisite: Satisfactory score on Mathematics Placement Test. Three lecture hours a week. Credit: Three hours.

MATH 2703. Data Collection. Planning and conducting sampling. Sampling techniques including random, stratified, and cluster sampling. Dealing with missing/incomplete data, outliers, imputation, and other complications that arise with real-world data. Prerequisite: MATH 1703 or MATH 1713, or instructor approval. Three lecture hours a week. Credit: Three hours.

MATH 3003. A Survey of Geometry. Historical origins and elements of modern geometry. A preview of elementary transformations and dissection theory, projective geometry, and Euclidean and non-Euclidean geometry. Prerequisite: MATH 2014. Three lecture hours a week. Credit: Three hours.

MATH 3013. Discrete Mathematics. Sets, functions, Boolean algebra, logic, number theory and representations, graph theory, algorithms, and computability. Prerequisite: MATH 2014 or permission of department. Three lecture hours a week. Credit: Three hours.

MATH 3053. Abstract Algebra. Introduction to sets, relations, mappings, rings, integral domains, fields, groups. Prerequisite: MATH 3013 or permission of the instructor. Three lecture hours a week. Credit: Three hours.

MATH 3063. Linear Algebra. Linear equations and matrices; vector spaces; linear mappings; determinants. Prerequisite: MATH 2014 or permission of instructor. Three lecture hours a week. Credit: Three hours.

MATH 3073. Matrix Methods. Matrix operations, determinants, inverse of a matrix, solution of linear systems, eigenvalues and eigenvectors, matrix calculus. Prerequisite: MATH 2014 or permission of instructor. Three lecture hours a week. Credit: Three hours.

MATH 3083. Elementary Number Theory. Diophantine equations; congruences; divisibility properties of integers; prime numbers and factorization theorems; multiplicative functions. Prerequisite: MATH 2014 or permission of instructor. Three lecture hours a week. Credit: Three hours.

MATH 3104. Calculus III. Solid analytic geometry; vectors in space; functions of several variables; partial derivatives; multiple integrals; applications. Prerequisite: MATH 2024. Four lecture hours a week. Credit: Four hours.

MATH 3123. Differential Equations. Solutions of differential equations of the first order and applications; linear differential equations with applications; solution by power series and numerical methods; systems of differential equations; introduction to partial differential equations. Prerequisite: MATH 2024. Three lecture hours a week. Credit: Three hours.

MATH 3583. Statistical Methods II. Overview of statistical methods in research. Analysis of variance, chi squared tests, regression (simple, multiple, and logistic), correlation, nonparametrics, and survival analysis. Incorporation of statistical software. Prerequisite: MATH 1703 or MATH 1713, or instructor approval. Credit: Three hours.

MATH 3593. Statistical Methods III. Methods of designing experiments utilizing regression analysis and the analysis of variance. Parameter estimation, model estimation, and testing. Model diagnostics and assumptions, residual analysis, variable selection, and multicollinearity. Basic and intermediate design of experiments. Prerequisite: MATH 3583. Three lecture hours a week. Credit: Three hours.

MATH 4003. Mathematical Concepts in the Educational Setting. Problem solving, reasoning, sets, geometry, algebra, trigonometry, matrices, statistics and probability, sequences and series, graph theory, integration, differentiation, vectors. Prerequisite: Upper-level standing. Three lecture hours a week. Credit: Three hours.

MATH 4013. Probability and Statistics. The theory of discrete and continuous random variables and their distributions. Topics include expected values, binomial and normal distributions, the central limit theorem, confidence intervals, and hypothesis testing. Prerequisite: MATH 2014. Three lecture hours a week. Credit: Three hours.

MATH 4113. Computational Statistics. Introduction to computation methods for statistical problems. Simulation-based approaches and basic numerical methods. Prerequisite: MATH 3583 or instructor approval. Three lecture hours a week. Credit: Three hours.

MATH 4203. Problem Solving in the Mathematics Classroom. Strategies of problem solving; methods for teaching and applying different strategies in grades 4-12; assessment of problem solving skills; critical thinking skills. Prerequisite: Upper-level standing. Three lecture hours a week. Credit: Three hours.

MATH 4303. Algebra in the Mathematics Classroom. Patterns, relationships, ordered pairs, prime and composite numbers, orders of operations, exponents, number sentences, ratios, proportions, percents, modeling, formulas, equations, graphs, functions, systems of equations. Prerequisite: Upper-level standing. Three lecture hours a week. Credit: Three hours.

MATH 4311. Seminar in Mathematics. Capstone course. Compilation of a professional portfolio, completion of a multifaceted project on a current issue in or application of mathematics, development of skills in defining problems and opportunities, and generation of strategies and solutions for those problems. Requires a written component, an oral presentation of project, and an exit exam. Prerequisite: 24 hours of course work in mathematics or permission of the instructor. One seminar hour a week. Credit: One hour.

MATH 4313. Geometry in the Mathematics Classroom. Topics in geometry with an emphasis in problem solving, shapes, angles, polygons, circles, Pythagorean Theorem, symmetry, transformations, measurement area, and volume with an emphasis on technology. Prerequisite: Upper-level standing. Three lecture hours a week. Credit: Three hours.

MATH 4713. Nonparametric Statistics. Introduction to nonparametric techniques for statistical inference. Levels of measurement, comparisons of two populations, tests of fit, nonparametric analysis of variance, and correlation. Prerequisite: MATH 3583 or instructor approval. Three lecture hours a week. Credit: Three hours.

MATH 4873. Real Analysis. Fundamentals of mathematical analysis: introduction to proofs, topology, convergence of sequences and series, continuity, differentiability, Riemann integral, sequences and series of functions, uniformity, and the interchange of limit operations; utility of abstract concepts and construction of proofs. Prerequisites: MATH 2024 and MATH 3053. Three lecture hours a week. Credit: Three hours.

MATH 4903. Special Topics. Variable content in mathematics. Three lecture hours a week. Credit: Three hours.

MATH 4911. Independent Study. Individual study in mathematics. Credit: One hour.

MATH 4913. Independent Study. Individual study in mathematics. Credit: Three hours.

MATH 4953. Internship. Credit: Three hours.

MATH 4956. Internship. Credit: Six hours.