

Mathematics

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To find faculty & staff phone numbers and email addresses, please consult the University Directory (<http://www.dixie.edu/directory/directory.php>).

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Program Description

The Dixie State University Mathematics Department helps students to achieve their academic, career, and life goals; including those related to basic computational skills, mathematical processes, and knowledge that develops real-life applications, modeling, and problem solving. The Department's comprehensive and integrated offerings help students master mathematical competencies for future career and educational endeavors.

As part of an open-admissions institution, the Department offers a broad spectrum of Mathematics classes that are useful for skill levels from developmental to selected four-year degree requirements. The Mathematics faculty is dedicated to providing opportunities that promote student success.

Students may enroll in Bachelor of Arts in Mathematics, Bachelor of Science in Mathematics, Bachelor of Arts in Mathematics Education, or Bachelor of Science in Mathematics Education degrees. In addition, students can select Mathematics as an emphasis in the Integrated Studies Bachelor of Art or Bachelor of Science programs. The DSU Mathematics Department also offers all coursework necessary to obtain a Utah Secondary Education Math Endorsement. Dixie State University also offers the **Math Endorsement for Secondary Education**. The following are help links for endorsement students:

Endorsement Levels (<https://math.dixie.edu/wp-content/uploads/sites/10/2015/06/ENDORSEMENT-LEVELS.pdf>)

Endorsement Checklist (<https://math.dixie.edu/wp-content/uploads/sites/10/2015/06/NewEndorsementChecklist.pdf>)

Course Prefixes:

- MATH

Degrees, Minors & Suggested Courses

- Bachelor of Arts / Science in Mathematics (catalog.dixie.edu/programs/mathematics/bachelor_of_artscience_in_mathematics)
- Bachelor of Arts / Science in Mathematics Education (catalog.dixie.edu/programs/mathematics/bachelor_of_artsciences_in_mathematics_education)
- Bachelor of Arts/ Science in Integrated Studies - Mathematical Sciences Emphasis (catalog.dixie.edu/programs/interdisciplinaryartsandsciences/bachelor_of_sciencebachelor_of_arts_in_integrated_studies__mathematical_sciences_emphasis)
- Minor in Mathematics (catalog.dixie.edu/programs/mathematics/minor_in_mathematics)
- Minor in Mathematics Education (catalog.dixie.edu/programs/mathematics/minor_in_mathematics_education)
- Suggested Courses Leading to Utah Mathematics Endorsements (catalog.dixie.edu/programs/mathematics/suggested_courses_leading_to_utah_mathematics_endorsements)

Learning Outcomes

1. Employ mathematical techniques in computational problems.
2. Students will interpret mathematical models.
3. Construct quantitative, logical arguments.
4. Students will apply mathematical knowledge to real world problems.
5. Communicate in the mathematical language through the use of proper notation and terminology.
6. Students will explore and analyze mathematical concepts, using technology as appropriate.

The level of sophistication and maturity of thinking expected of university students in the area of mathematics must extend their aptitude for quantitative reasoning beyond routine problem solving. This reasoning will allow the student to handle problem situations of greater complexity and diversity and lead them to an ability to mathematically analyze ideas both within and outside of mathematics.

Mathematics Career Information

Career Opportunities*

With a bachelor's degree in mathematics, careers as operations research analysts and actuaries are among the post-graduation options available. Operations research analysts use advanced mathematical and analytical methods to investigate, identify, and solve problems, and actuaries analyze the financial costs of risk and uncertainty for businesses and clients. They use mathematics, statistics, and financial theory to assess the risk that an event will occur, and help clients minimize the cost of that risk.

With a master's degree, the option to become a mathematician or a statistician becomes available.

Job Outlook*

Employment for operations research analysts is projected to increase by 30% between 2014 and 2024, much faster than average. In the same decade, employment for actuaries should grow 18%, also faster than average for all occupations.

Salary Range*

The median annual wage for operations research analysts was \$78,630 in May 2015. The lowest 10 percent earned less than \$43,520, and the highest 10 percent earned more than \$132,500. For actuaries, the median annual wage was \$97,070. The lowest 10 percent earned less than \$58,290, and the highest 10 percent earned more than \$180,500.

Mathematics Education

Job Outlook*

Employment of middle school and high school teachers is expected to grow 6% from 2014 to 2024, about as fast as average for all occupations.

Salary Range*

In 2015, the median annual wage for middle school teachers was \$55,860. The lowest 10 percent earned less than \$37,350, with the highest 10 percent earning more than \$87,060. For high school teachers, the median annual wage was \$57,200. The lowest 10 percent earned less than \$37,800, and the highest earned more than \$91,190.

* Derived from the Occupational Outlook Handbook

Courses

MATH 0900. Transitional Math I. 3 Hours.

Designed for students with an ACT Math score of 0-12 or CPT of 0-30. For students needing to learn or review basic mathematics skills. Covers operations on whole numbers, fractions, decimals, percent with applications, ratios and proportions, signed numbers, linear equations with applications, positive integral exponents, geometry, and polynomials. Graphing and polynomial factoring will be introduced. Successful completers (Grade C or higher) will be prepared to enroll in MATH 1000. Course fee required. FA, SP.

MATH 0920. Basic Math/Pre-Algebra. 4 Hours.

Designed for students with an ACT Math score of 12 or lower or for students needing to learn or review basic mathematics skills. Covers operations on whole numbers, fractions, decimals, percents with applications, ratios and proportions, signed numbers, linear equations with applications, positive integral exponents, geometry, and polynomials. Graphing and polynomial factoring will be introduced. Successful completers (Grade C or higher) will be prepared to enroll in MATH 0990. This course is offered in two delivery formats--lecture and individualized. Course fee required on individualized format MATH 0920 class. FA, SP, SU.

MATH 0990. Elementary Algebra. 4 Hours.

Designed for students with a Math placement score 13-17, or for students needing to learn or review elementary algebra. Covers operations on integers, fractions, integral exponents, polynomials with factoring, linear and quadratic equations with applications, rational expressions, linear systems, graphing, and radicals. Successful completers (Grade C or higher) will be prepared to enroll in Math 1010. Prerequisite: Math placement score 13 or higher, OR MATH 0920 (Grade C or higher). FA, SP, SU.

MATH 1000. Transitional Mathematics II. 3 Hours.

Prepares students for courses that fulfill the General Education Math requirement. Concepts emphasized in this course include the properties of the real number system, sets, functions, graphs, algebraic manipulations, linear and quadratic equations, systems of equations, and story problems. Students will be expected to reason mathematically and solve mathematical problems. Successful completion of the course gives students good preparation for college-level math courses. Successful completers satisfy prerequisite for MATH 1030, MATH 1040, MATH 1050, and Mathematics prerequisite for BIOL 2030, CHEM 1110, PHYS 1010, and STAT 2040. Course fee required. Prerequisites: MATH 0900 (Grade C or higher) within two years of enrollment in this course; OR ACT or equivalent placement score 13 or higher within two years of enrollment in this course; OR Accuplacer score of 31 or higher within two years of enrollment in this course. FA, SP, SU.

MATH 1001. FYE: Mathematics. 1 Hour.

A First Year Experience course created to help students succeed in the Math major, and assist new freshmen and returning students to make a successful transition to being a college student. The primary objective of this course is to provide students with the resources they will need to succeed in their college careers, particularly in the Math major. Multiple listed with all other sections of First Year Experience (all 1001 courses, ENGR 1000). Students may only take one FYE course for credit. FA.

MATH 1010. Intermediate Algebra. 4 Hours.

Prepares students for courses that fulfill the General Education Math requirement. Concepts emphasized include the properties of the real number system, sets, functions, graphs, algebraic manipulations, linear and quadratic equations, systems of equations, and story problems. Students will be expected to reason mathematically and solve mathematical problems. Successful completion of the course gives students good preparation for college-level Math courses. Successful completers satisfy prerequisite for MATH 1030, MATH 1040, MATH 1050, MATH 1080, and Mathematics prerequisite for CHEM 1110, IT 3050, PHYS 1010, SOC 3112, and STAT 2040. Prerequisite: MATH 0900 or MATH 0990 (Grade C or higher within two years of enrollment in this course), OR ACT placement score 18 or higher or equivalent, within two years of enrollment in this course.

MATH 1030. Quantitative Reasoning. 3 Hours.

Fulfills General Education Mathematics requirement for students in Fine Arts, Liberal Arts and other degrees. Focuses on development of analytical problem solving skills through the application of various mathematical concepts to real-life problems. Topics include logic; financial math; problem solving; numeration systems; geometry; measurements; probability; statistics; and modeling with algebra. A class presentation is required for this course. Students are cautioned to check degree and/or transfer requirements before taking this course. Course fee required. Prerequisite: MATH 1010 or MATH 1000 (Grade C or higher) within two years of enrollment in this course; OR ACT or equivalent placement score 23 or higher, or CPT placement score of 89 or higher within two years of enrollment in this course. FA, SP.

MATH 1040. Introduction to Statistics. 3 Hours.

Fulfills General Education Mathematics requirement for students majoring in Communications, Social & Behavioral Sciences, Fine Arts, or Liberal Arts. Introduction to basic concepts and methods used in statistical data analysis, includes descriptive statistics, sampling, and inferential methods while emphasizing problem solving and critical thinking. StatCrunch is used to perform statistical calculations, organize and analyze data, and construct graphs. Required for Utah Level 2 Math Endorsement. Students are cautioned to check degree and/or transfer requirements before taking this course. Course fee required. Prerequisite: MATH 1010 or MATH 1000 (Grade C or higher) within two years of enrollment in this course; OR ACT or equivalent placement score 23 or higher, or CPT placement score of 89 or higher within two years of enrollment in this course. FA, SP, SU.

MATH 1050. College Algebra / Pre-Calculus. 4 Hours.

Fulfills General Education Mathematics requirement for students majoring in Business, Elementary Education, Health Sciences, Science, and other majors. Reviews fundamental algebra; explores polynomial and rational functions; introduces exponential and logarithmic functions and applications; conics; systems of linear equations and applications; arithmetic and geometric sequences and series, binomial coefficients and the Binomial Theorem; basic principle of counting. Course fee required. Prerequisite: MATH 1010 or MATH 1000 (Grade C or higher) within two years of enrollment in this course; OR ACT or equivalent placement score 23 or higher, or CPT placement score of 89 or higher within two years of enrollment in this course. FA, SP, SU.

MATH 1060. Trigonometry. 3 Hours.

Fulfills General Education Mathematics requirement. Continuation of MATH 1050, utilizes unit circle and right triangle definitions, graphs of trigonometric functions, solving trigonometric equations, and verifying trigonometric identities. Involves polar and parametric functions, vectors, and conic sections. Required for Utah Level 2 and Level 3 Math Endorsements. Course fee required. Prerequisite: MATH 1050 (Grade C or higher) within two years of enrollment in this course; OR ACT or equivalent placement score 25 or higher; OR CPT placement score of 95 or higher within two years of enrollment in this course. FA, SP, SU.

MATH 1080. Pre-Calculus with Trigonometry. 5 Hours.

Fulfills General Education Mathematics requirement. Provides in-depth review of college algebra and trigonometry before entering trig-based calculus by reviewing concepts taught in MATH 1050 and MATH 1060. Successful completion fulfills prerequisite for MATH 1210, and Mathematics prerequisite for PHYS 2010. Prerequisite: MATH 1010 or MATH 1000 (Grade B or higher) within two years of enrollment in this course; OR ACT or equivalent placement score 25 or higher; OR CPT placement score of 95 or higher within two years of enrollment in this course. FA, SP.

MATH 1100. Business Calculus. 3 Hours.

Fulfills General Education Mathematics requirement. Required of majors in the Udvar-Hazy School of Business, as well as students majoring in Computer & Information Technology. Emphasizes functions, modeling, differentiation, applications of differentiation, exponential and logarithmic functions, integration, applications of integration, and functions of several variables. Course fee required. Prerequisite: MATH 1050 (Grade C or higher) within two years of enrollment in this course; OR ACT or equivalent placement score 25 or higher; OR CPT placement score of 95 or higher within two years of enrollment in this course. FA, SP, SU.

MATH 1210. Calculus I. 4 Hours.

Fulfills General Education Mathematics requirement. Students will gain a basic understanding of calculus, including limits and derivatives, differentiation rules, applications of differentiation and integrals. Students must have a working knowledge of college algebra and trigonometry. Required for Utah Level 2, 3, and 4 Math Endorsements, and for students majoring in Computer Science, Computer and Information Technology--Software Development Emphasis, Biology, Physical Science Composite Teaching and Pre-engineering. Successful completion fulfills prerequisite for MATH 1220, and Mathematics prerequisite for ENGR 2010 and PHYS 2210. Prerequisite: MATH 1050 AND MATH 1060 (Grade C or higher); OR MATH 1080 (Grade C or higher); OR ACT or equivalent placement score 26 or higher; OR CPT placement score of 105 or higher within two years of enrollment of this course. FA, SP, SU.

MATH 1220. Calculus II. 4 Hours.

Fulfills General Education Mathematics requirement. Continuation of MATH 1210, covering applications of integration, differential equations, infinite sequences and series. Required for Utah Level 3 and 4 Math Endorsements, and for students majoring in Mathematics, Chemistry, Computer Science and Physical Science Composite Teaching. Successful completion fulfills prerequisite for MATH 2210, and Mathematics prerequisite for ENGR 2250, ENGR 2300, and PHYS 2220. Prerequisite: MATH 1210 (Grade C or higher). FA, SP, SU.

MATH 2010. Math for Elementary Teachers I. 3 Hours.

The first course in a 2-semester sequence of mathematics appropriate to the needs of elementary and middle school teachers. Includes problem solving, sets, numeration systems, whole numbers, algorithms of arithmetic, number theory, rational numbers and decimal numbers. Required for Utah Elementary Education (Level 1) and Level 2 Math Endorsements. Prerequisite: MATH 1050 (Grade C or higher). FA, SP.

MATH 2020. Math for Elementary Teachers II. 3 Hours.

The second course in a 2-semester sequence of mathematics appropriate to the needs of elementary and middle school teachers. Continuation of Math 2010. Includes real numbers, statistics, probability, geometry, measurement, and algebra. Required for Utah Elementary Education (Level 1) and Level 2 Math Endorsements.

Prerequisite: MATH 2010 (Grade C or higher). FA, SP.

MATH 2200. Discrete Mathematics. 3 Hours.

Introduction to proofs and writing Mathematics. Covers Logic (including Boolean), Sets, Functions, Equivalence Relations, Modular Arithmetic, and Graph Theory. Also covers propositional calculus, combinatorics, and Counting Methods. Prerequisite: MATH 1210 (Grade C or higher). FA, SP.

MATH 2210. Multivariable Calculus. 4 Hours.

Fulfills General Education Mathematics requirement. Continuation of MATH 1220. Includes vectors and the geometry of space, vector functions, partial derivatives, multiple integrals, and vector calculus. Required for Utah Level 3 and Level 4 Endorsement. Prerequisite: MATH 1220 (Grade C or higher). FA, SP.

MATH 2270. Linear Algebra. 3 Hours.

For Mathematics and pre-Engineering majors. Covers matrix and vector analysis and systems of equations with applications, linear dependence and independence, matrix algebra and invertibility, determinants and their applications, Cramer's Rule, diagonalization, eigenvalues and eigenvectors, linear transformations (kernel and range), inner product, orthogonality, vector spaces and subspaces, including null and column and bases as well as introducing basic proof theory. Required for Utah Level 3 and 4 Math Endorsements. Prerequisite: MATH 1210 (Grade C or higher). FA, SP.

MATH 2280. Ordinary Differential Equation. 3 Hours.

For Mathematics and pre-Engineering majors. Covers methods of solving ordinary differential equations with applications: separation of variables, homogeneous and non-homogeneous, exact, first and higher order, integrating factors, substitution methods, linear and non-linear, complex characteristic roots, variation of parameters, undetermined coefficients (superposition and annihilator approach), and Euler-Cauchy. Systems of equations, power series solutions, and the Laplace transform will be introduced. Required for Utah Level 4 Math Endorsement. Prerequisite: MATH 1220 (Grade C or higher). SP.

MATH 2989. TI-89 Calculator Skills. 1 Hour.

Designed to aid students in using the TI-89 (or similar) calculator through a study guide, demonstrations, and hands-on experience. Covered features include basic computation, matrices, graphing, and calculus applications. Each student must own or have access to a TI-89, TI-92, or TI Voyage 200 calculator. FA, SP.

MATH 2990. Seminars in Math. 0.5-3 Hours.

For students wishing instruction that is not available through other regularly scheduled courses in this discipline. Occasionally, either student demand for some type of non-traditional instruction, or an unanticipated opportunity for instruction presents itself. The seminar courses provides a variable credit context for these purposes. This seminar course must first be pre-approved by the department chair; second, it must provide at least nine contact hours of lab or lecture for each credit hour offered; and third, it must include some academic project or paper (i.e., credit is not given for attendance alone). This course may include standard lectures, travel and field trips, guest speakers, laboratory exercises, or other non-traditional instruction methods. Note that this course is an elective and does not fulfill general education or program requirements. Prerequisite: Instructor permission.

MATH 3000. History of Mathematics. 3 Hours.

Selected topics in mathematics developed from ancient to modern times and the study of biographies of prominent mathematicians. Required for Utah Level 4 Math Endorsement. Prerequisite: MATH 1220 (Grade C or higher). FA (odd).

MATH 3100. Euclidean / Non-Euclidean Geom. 3 Hours.

Includes axiomatic development of Euclidean and non-Euclidean geometry. Computer-based GeoGebra program is used. Required for Utah Level 3 and 4 Math Endorsements. Prerequisite: MATH 2200 (Grade C or higher). SP (odd).

MATH 3150. Introduction to Partial Differential Equations. 3 Hours.

First-Order Partial Differential Equations (PDEs), Second-Order PDEs, Fourier Series, The Heat Equation, The Wave Equation, Laplace's Equation, The Fourier Transform Methods for PDEs. Prerequisite: MATH 2210 and MATH 2270 and MATH 2280 (all Grade C or higher). FA (odd).

MATH 3200. Introduction to Analysis I. 3 Hours.

For students interested in advanced Mathematics. Introduces the construction of rigorous proofs of mathematical claims in beginning analysis. Required for Utah Level 4 Math Endorsement. Prerequisite: MATH 2200 (Grade C or higher); AND MATH 2210 (Grade C or higher). FA (odd years).

MATH 3210. Introduction to Analysis II. 3 Hours.

Continuation of MATH 3200. Includes continuity, differentiation, chain rule, Riemann integration, Fubini's theorem, and change of variable formula. Prerequisite: MATH 3200. SP (even).

MATH 3400. Probability & Statistics. 3 Hours.

Mathematics-based statistics. Topics include: Concepts in probability, discrete, continuous and bivariate distributions, distributions of functions of random variables, point and interval estimation, tests of hypothesis, and regression. Calculators with statistical functions is required. Required for Utah Level 3 and 4 Math Endorsement. Prerequisite: MATH 1220 (Grade C or higher). SP (odd).

MATH 3500. Numerical Analysis. 3 Hours.

Includes numerical solutions of nonlinear equations, interpolation and approximation, numerical integration and differentiation, and solutions of linear systems, numerical solutions of ordinary and partial differential equations, using Maple software to implement various algorithms numerically. Prerequisites: MATH 2270 AND MATH 2280. FA (even).

MATH 3900. Number Theory. 3 Hours.

Overview of number theory and its applications, including the integers, factorizations, modular arithmetic, congruencies, Fermat's and Euler's Theorems, diophantine equations, cryptography, and RSA algorithm. Required for Utah Level 4 Math Endorsement. Prerequisite: MATH 2200. SP (even).

MATH 4000. Foundations of Algebra. 3 Hours.

For students in all Math-related majors. Covers an introduction to algebraic systems including group rings, fields and sets. Required for Utah Level 3 and 4 Math Endorsements. Prerequisite: MATH 2200. FA (even).

MATH 4010. Abstract Algebra. 3 Hours.

Continuation of MATH 4000. Topics include Sylow Theory for finite groups, Galois Theory, factorization in commutative rings. Prerequisite: MATH 4000. SP (odd).

MATH 4100. Introduction to Topology. 3 Hours.

Overview of elementary point-set topology. Includes topological spaces, compactness, connectedness, metric spaces, and Hausdorff spaces. Prerequisites: MATH 2200 AND MATH 2210. FA (odd).

MATH 4200. Introduction to Complex Analysis. 3 Hours.

Overview of basic theory and applications of complex variables, including analytic functions, contour integration, and conformal mappings. Prerequisite: MATH 3200. SP (even).

MATH 4500. Methods Teach Secondary Math. 3 Hours.

Designed for pre-service secondary math teachers or those seeking Utah Level 2, 3, 4 Mathematics Endorsement. Course content includes use of curriculum and research in the 7- 12 grade classroom, development of math pedagogical skills, accommodations for diverse learners, factors of motivation, and professional growth. Technology will include graphing calculators, classroom on-line learning systems, and mathematical instructional software. Required for Utah Level 2, 3, and 4 Math Endorsements. Prerequisite: MATH 1210 (Grade C or higher). FA.

MATH 4890R. Independent Research. 1-3 Hours.

Designed to meet the individual needs of advanced students in the Math Department who wish to perform an independent research to answer a specific mathematical question. This course is offered by arrangement with an individual faculty, based on preparation and interest, and allows close interaction between the student and faculty member to address specific mathematical problems. Projects are at the discretion of the faculty member, in line with the student's interests in the various mathematics subject areas. The student and faculty will set expectations and grading policies at the beginning of the term. Students are expected to meet with the faculty mentor each week and to provide the faculty mentor with progress reports and assignment development for feedback. Prerequisite: Instructor permission required. FA, SP, SU.

MATH 4900. Senior Capstone Seminar. 3 Hours.

Independent Study. Required of all Mathematics majors in the senior year. Emphasizes the ability to analyze and communicate mathematically through projects to include researching topics, summarizing journal articles, using a technical documentation system such as LaTeX or Equation Editor, and making oral class presentations. Preparation for and completion of standardized exit exam is required. Prerequisite: Senior standing; and Mathematics major. SP.