APPLIED MATHEMATICS, MINOR

Program Requirements

Students majoring in other academic fields who wish to earn a minor in applied mathematics must complete the following courses.

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 2413</td>
<td>Calculus I</td>
<td>4</td>
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<tr>
<td>MATH 2414</td>
<td>Calculus II</td>
<td>4</td>
</tr>
</tbody>
</table>

Select four of the following: 12-13

- COSC 3385  Numerical Methods
- MATH 2415  Calculus III
- MATH 3301  Introduction to Complex Analysis
- MATH 3310  Mathematical Analysis for Mechanical Engineering
- MATH 3311  Linear Algebra
- MATH 3315  Differential Equations
- MATH 3342  Applied Probability and Statistics

Total Hours 20-21

Waivable 3: May be waived with suitable placement; see placement section below for more details. If needed, upper-level mathematics electives must be taken to bring the total to 19 hours.

* Online offering

^ Blended offering

Courses

MATH 0099  Math Non-Course Based Development
0 Semester Credit Hours

Preparation workshop to help students achieve College Readiness in mathematics under the Texas Success Initiative. Topics include five general areas: fundamental mathematics, algebra, geometry, statistics, and problem solving.

MATH 0200  Brief Developmental Mathematics
1-2 Semester Credit Hours (1-2 Lecture Hours)

Topics as in MATH 0300. For students who have completed most topics in MATH 0300. Requires permission of MATH department. (Not counted toward graduation) Fall, Spring, Maymester, Summer.

Co-requisite: MATH 1314, MATH 1442.

MATH 0214  Brief Developmental Mathematics-Algebra
2 Semester Credit Hours (2 Lecture Hours)

This course is co-requisite course supporting for MATH 1314. Support will focus on essential skills required for success in College Algebra (Math 1314). Supporting topics include review of intermediate algebra, polynomial equations, graphing techniques, and applications. Course provides the necessary academic support for TSI liable students concurrently enrolled in MATH 1314 as the co-requisite with MATH 0214. Students who register for MATH 0214 must co-register in MATH 1314. Math 0214 is not counted toward graduation. Fall, Spring, Summer.

Co-requisite: MATH 1314.

MATH 0224  Brief Developmental Mathematics-Business Mathematics
2 Semester Credit Hours (2 Lecture Hours)

This course is the co-requisite course supporting for MATH 1324. Support will focus on essential skills required for success in Business Math (Math 1324). Supporting topics include the use of calculators and technology. Topics focus on basic review of mathematical skills, elementary algebra, mathematical and logical reasoning, probability, and financial management, while providing the necessary academic support for TSI liable students concurrently enrolled in MATH 1324 as the co-requisite with MATH 0224. Students who register for MATH 0224 must co-register in MATH 1324. Math 0224 is not counted toward graduation. Fall, Spring, Summer.

Co-requisite: MATH 1324.

MATH 0232  Brief Developmental Mathematics-Contemporary Mathematics
2 Semester Credit Hours (2 Lecture Hours)

This course is co-requisite course supporting for MATH 1332. Support will focus on essential skills required for success in Contemporary Mathematics (Math 1332). Supporting topics include a basic review of mathematical skills, elementary algebra, mathematical and logical reasoning, probability, and descriptive statistics, while providing the necessary academic support for TSI liable students concurrently enrolled in MATH 1332 as the co-requisite with MATH 0232. Students who register for MATH 0232 must co-register in MATH 1332. Math 0232 is not counted toward graduation. Fall, Spring, Summer.

Co-requisite: MATH 1332.

MATH 0242  Brief Developmental Mathematics-Statistics
2 Semester Credit Hours (2 Lecture Hours)

This course is co-requisite course supporting for MATH 1442. Support will focus on essential skills required for success in Statistics for Life (Math 1442). Supporting topics include the use of calculators and technology. Topics focus on descriptive and inferential statistics, probabilities including notation, while providing the necessary academic support for TSI liable students concurrently enrolled in MATH 1442 as the co-requisite with MATH 0242. Students who register for MATH 0242 must co-register in MATH 1442. Math 0242 is not counted toward graduation. Fall, Spring, Summer.

Co-requisite: MATH 1442.

MATH 0300  Developmental Mathematics
3 Semester Credit Hours (3 Lecture Hours)

Topics include number concepts, computation, elementary algebra, geometry, and mathematical reasoning. Also, linear equations and inequalities, rational expressions, exponents and radicals, quadratics and word problems. May be repeated for credit as needed to complete mastery of all topics. (Not counted toward graduation.) Fall, Spring, Summer.

MATH 0310  Development Mathematics-Algebra
3 Semester Credit Hours (2 Lecture Hours, 2 Lab Hours)

3 sem. hrs. (2:2) Topics include number concepts, computation, elementary algebra, and geometry. Also, linear equations and inequalities, rational expressions, exponents and radicals, quadratics and word problems. May be repeated for credit as needed to complete mastery of all topics. (Not counted toward graduation.) Fall, Spring, Summer.

MATH 0398  Introduction to Algebra
3 Semester Credit Hours (3 Lecture Hours)

Number concepts, computation, elementary algebra, geometry, and mathematical reasoning.
MATH 0399 Intermediate Algebra
3 Semester Credit Hours (3 Lecture Hours)
Topics include linear equations and inequalities, rational expressions, exponents and radicals, quadratics and word problems.
Prerequisite: MATH 0398.

MATH 1014 Essential Support for College Algebra for STEM Majors
0 Semester Credit Hours
Focuses on essential skills required for success in College Algebra for STEM majors (Math 1314-designated sections). Students who register for MATH 1014 must co-register in MATH 1314 sections designated with S. Math 1014 is not counted toward graduation. Fall, Spring, Summer.
Co-requisite: MATH 1314.

MATH 1024 Essential Support for Business Math
0 Semester Credit Hours
Supports MATH 1324 with focus on essential skills required for success in Business Math, and providing the necessary academic support for TSI liable students concurrently enrolled in MATH 1324. Students who register for MATH 1024 must co-register in MATH 1324. Math 1024 is not counted toward graduation. Fall, Spring, Summer.
Co-requisite: MATH 1324, MATH 1325.

MATH 1314 College Algebra
3 Semester Credit Hours (3 Lecture Hours)
Quadratic equations, inequalities, graphs, logarithms and exponents, theory of polynomial equations, systems of equations by using matrix. Counts as the mathematics component of the University Core Curriculum. Fall, Spring, Summer. Students in STEM programs must register in sections with S designation. Meets 3 hours per week with one meeting per week in MATH 1014.
Prerequisite: MATH 0300, 0300, minimum score of 530 in 'SAT MATH SECTION', minimum score of 19 in 'ACT1 Math', MATH 0320, 0320, minimum score of 350 in 'TSI Math', minimum score of 910 in 'TSIA2 Math' or minimum score of 6 in 'TSIA2 Math Diagnostic'.
TCCNS: MATH 1314

MATH 1316 Trigonometry
3 Semester Credit Hours (3 Lecture Hours)
Trigonometric functions, identities, equations involving trigonometric functions, solutions of right and oblique triangles.
Prerequisite: (MATH 1314, 1314, minimum score of 550 in 'SAT MATH SECTION' or minimum score of 21 in 'ACT1 Math') or minimum score of 21 in 'ACT Math'.
TCCNS: MATH 1316

MATH 1324 Mathematics for Business and Social Sciences
3 Semester Credit Hours (3 Lecture Hours)
Students will learn how the properties and language of mathematics can be used in business and real-world problem solving and understand the techniques and applications of finance problems, basic matrix operation, basic counting principles, probability analysis in modeling real-world scenarios, and review of Algebra topics. Three lecture hours plus one discussion session a week in corequisite (MATH 1024) This course could be taught in 14-weeks or 7-weeks semesters, and in F2F or fully online formats. May not be counted toward a degree in the Colleges of Science or Engineering. Fall, Spring Summer.
Prerequisite: minimum score of 550 in 'SAT MATH SECTION', minimum score of 21 in 'ACT Math' or minimum score of 21 in 'ACT1 Math'.
TCCNS: MATH 1324

MATH 1325 Calculus for Business & Social Sciences
3 Semester Credit Hours (3 Lecture Hours)
Students will develop and combine the concepts in and relationships between Mathematics and Business from the fundamentals of calculus and optimization in all Business fields. Students are expected to learn the materials algebraically with technology. Students will combine the concepts of limits, continuity, differentiation and integration techniques to solve problems in business, economics, and social sciences. Three lecture hours plus one discussion session a week in MATH 1025. This course could be taught in 14-weeks and 7-weeks semesters in F2F and fully online formats. May not be counted toward a degree in the Colleges of Science or Engineering. Fall, Spring, Summer.
Prerequisite: MATH 1324, minimum score of 550 in 'SAT MATH SECTION', minimum score of 21 in 'ACT1 Math' or minimum score of 21 in 'ACT Math'.
Co-requisite: MATH 1025.
TCCNS: MATH 1325

MATH 1332 Contemporary Mathematics
3 Semester Credit Hours (3 Lecture Hours)
This course serves as a terminal course and supplies a brief overview of several topics in mathematics. Topics may include introductory treatments of sets, logic, number systems, number theory, relations, functions, probability and statistics. Appropriate applications are included. This course emphasizes using critical thinking to make decisions based on information.
TCCNS: MATH 1332

MATH 1390 Introduction to Mathematical Topics
1-3 Semester Credit Hours (1-3 Lab Hours)
A course to introduce students to mathematical topics in a formal setting. The course may support problem solving, or systematic investigations of topics outside the current mathematical catalog. May not be substituted for regularly scheduled offerings.
MATH 1442  Statistics for Life
4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)
An introduction to statistical concepts and methods used in all disciplines to enhance decision making based on data analysis, including: basic experimental design models, measurement and data collection through sampling; display and summary of information, and assessment of relationship through descriptive techniques; probability concepts leading to estimation and hypothesis testing of means, variance and proportions, regression analysis, one-factor ANOVA and chi-square test of independence; and applications through case studies. The laboratory component of the course offers applications of the theory presented during the classroom sessions.
Prerequisite: MATH 0300, 0300, minimum score of 530 in 'SAT MATH SECTION', minimum score of 19 in 'ACT Math', MATH 0310, 0310, 0320, 0320, minimum score of 350 in 'TSI Math' or minimum score of 19 in 'ACT Math'.
TCCNS: MATH 1442

MATH 2305  Discrete Mathematics I
3 Semester Credit Hours (3 Lecture Hours)
An introduction to topics in Discrete Mathematics with an emphasis on applications in Mathematics and Computer Science. Topics include formal logic, graphs, trees and related algorithms, and combinatorics and discrete probability.
Prerequisite: MATH 2413, 2413, minimum score of 620 in 'SAT Math', minimum score of 620 in 'SAT1 Mathematics', minimum score of 640 in 'SAT MATH SECTION', minimum score of 27 in 'ACT Math' or minimum score of 27 in 'ACT1 Math'.
TCCNS: MATH 2305

MATH 2312  Precalculus
3 Semester Credit Hours (3 Lecture Hours)
A more rapid treatment of the material in MATH 1314 and MATH 1316, this course is designed for students who wish a review of the above material, or who are very well prepared. Functions, graphs, trigonometry, and analytic geometry.
Prerequisite: MATH 1314, 1314, minimum score of 550 in 'SAT MATH SECTION', minimum score of 21 in 'ACT Math' or minimum score of 21 in 'ACT1 Math'.
TCCNS: MATH 2312

MATH 2413  Calculus I
4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)
Limits, continuity, derivatives, applications of the derivative, and an introduction to integrals. Contains a laboratory component.
Prerequisite: MATH 1316, 1316, 2312, 2312, minimum score of 640 in 'SAT MATH SECTION' or minimum score of 27 in 'ACT1 Math'.
TCCNS: MATH 2413

MATH 2414  Calculus II
4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)
Prerequisite: MATH 2413 or 2413.
TCCNS: MATH 2414

MATH 2415  Calculus III
4 Semester Credit Hours (3 Lecture Hours, 2 Lab Hours)
Vectors and space curves, partial derivatives, multiple integrals, special coordinate systems, line and surface integrals, Green’s, Stokes’, and the Divergence Theorems. Contains a laboratory component. Vectors and space curves, partial derivatives, multiple integrals, special coordinate systems, line and surface integrals, Green’s, Stokes’, and the Divergence Theorems. Contains a laboratory component.
Prerequisite: MATH 2414 or 2414.
TCCNS: MATH 2415

MATH 3300  Geospatial Mathematical Techniques
3 Semester Credit Hours (3 Lecture Hours)
Characteristics of geographic/spatial information; overview of relevant sections of numbers, algebra and geometry, plane and spherical trigonometry, matrices, determinants and vectors, curves and surfaces, integral and differential calculus, partial derivatives, with an emphasis on geospatial applications. Concepts of geospatial coordinate systems and geospatial coordinate transformations; overview of spatial statistics and best-fit solutions with geospatial applications. Students may not receive credit for both MATH 3300 and DISC 3300.
Prerequisite: MATH 2413 and 2414.

MATH 3301  Introduction to Complex Analysis
3 Semester Credit Hours (3 Lecture Hours)
This course introduces functions of a complex variable and their applications. Contents include differentiation and integration; zeros, poles and residues; conformal mappings.
Prerequisite: (MATH 2415 or 2415) or (MATH 2414 or 2414 and MATH 3314 or 3314).

MATH 3310  Mathematical Analysis for Mechanical Engineering
3 Semester Credit Hours (3 Lecture Hours)
Applications of fundamentals of linear algebra, vector analysis, numerical methods, computer programming and probability and statistics into mechanical engineering. May not count towards the MATH major. Students may not receive credit for both MATH 3310 and MEEN 3310.
Prerequisite: MATH 3315.

MATH 3311  Linear Algebra
3 Semester Credit Hours (3 Lecture Hours)
Fundamentals of linear algebra and matrix theory. Topics include vectors, matrix operations, linear transformations, fundamental properties of vector spaces, systems of linear equations, eigenvalues and eigenvectors. Applications.
Prerequisite: MATH 2413 or 2413.

MATH 3312  College Geometry
3 Semester Credit Hours (2 Lecture Hours, 2 Lab Hours)
A careful study of the foundations of Euclidean geometry by synthetic methods with an introduction to non-Euclidean geometries. An introduction to transformational geometry.
Prerequisite: MATH 2413 or 2413.

MATH 3313  Foundations of Number Theory
3 Semester Credit Hours (3 Lecture Hours)
This course assists a student’s transition to advanced mathematics. Fundamentals of logic and proof are reviewed and applied to topics from elementary number theory.
Prerequisite: MATH 2414 or 2414.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Hours</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 3314</td>
<td>Foundations of Real Numbers</td>
<td>3</td>
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<td>(3 Lecture Hours)</td>
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<tr>
<td>MATH 3315</td>
<td>Differential Equations</td>
<td>3</td>
<td>MATH 2413 or 2413 and (COSC 1330, 1330, 1435 or 1435).</td>
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<td></td>
<td>(3 Lecture Hours)</td>
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<tr>
<td>MATH 3342</td>
<td>Applied Probability and Statistics</td>
<td>3</td>
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<td>(3 Lecture Hours)</td>
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<tr>
<td>MATH 3345</td>
<td>Statistical Modeling and Data Analysis</td>
<td>3</td>
<td>MATH 2415 or 2413 and (COSC 1330, 1330, 1435 or 1435).</td>
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<td>MATH 3347</td>
<td>Introduction to Probability</td>
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<tr>
<td>MATH 3349</td>
<td>Principles of Data Science</td>
<td>3</td>
<td>MATH 3315 and 2415.</td>
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<td>(3 Lecture Hours)</td>
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<tr>
<td>MATH 3385</td>
<td>Linear Optimization and Decisions</td>
<td>3</td>
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<tr>
<td>MATH 3390</td>
<td>Problem Solving in Mathematics</td>
<td>1-3</td>
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<td>(1-3 Lecture Hours)</td>
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<td>MATH 4185</td>
<td>Senior Mathematics Seminar</td>
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<td>(1 Lecture Hour)</td>
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<tr>
<td>MATH 4285</td>
<td>Mathematics Major Capstone</td>
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<td>MATH 4301</td>
<td>Introduction to Analysis</td>
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<tr>
<td>MATH 4306</td>
<td>Modern Algebra</td>
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<tr>
<td>MATH 4312</td>
<td>Differential Geometry</td>
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<td>-</td>
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<td>(3 Lecture Hours)</td>
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<tr>
<td>MATH 4315</td>
<td>Partial Differential Equations</td>
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<td>(3 Lecture Hours)</td>
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</table>

**Co-requisite:** MATH 3311 and 2413.
MATH 4321 Applied Regression Analysis
3 Semester Credit Hours (3 Lecture Hours)
Introduction to the formulation of linear models and the estimation of the parameters of such models, with primary emphasis on least squares. Application of multiple regression and curve fitting and the design of experiments for fitting regression models.
Prerequisite: MATH 1342, 2342 or 1470.

MATH 4328 Discrete Mathematics II
3 Semester Credit Hours (3 Lecture Hours)
A continued study of topics from Discrete Mathematics I with additional topics from discrete mathematics that have strong application to the field of computer science. Additional topics include: recurrence relations, formal languages, and finite-state machines.
Prerequisite: MATH 2305 and COSC 2437.

MATH 4342 Introduction to Mathematical Statistics
3 Semester Credit Hours (3 Lecture Hours)
This is a first course in mathematical statistics, topics include: moment-generating functions, functions of random variables, sampling distributions, methods of estimation including Bayesian estimation, characteristics of estimators, interval estimation, hypothesis testing, Neyman-Pearson Lemma, likelihood ratio test, tests involving means and variances, regression and correlation, multiple linear regression, introduction to ANOVA, non-parametric tests.
Prerequisite: MATH 2415.

MATH 4385 Applied Modeling
3 Semester Credit Hours (3 Lecture Hours)
Capstone course for mathematics majors. The construction of mathematical models from areas such as economics, refining, biology and mariculture, etc. Where possible, local phenomena will be modeled with the assistance of outside consultants.
Prerequisite: MATH 3315 and 3342 or MATH 3345.

MATH 4390 Selected Topics
3 Semester Credit Hours (3 Lecture Hours)
Offered on sufficient demand.

MATH 4696 Directed Independent Study
1-6 Semester Credit Hours
See college description.