

# Mathematics (MATH)

Detailed MATH placement options to meet requisites (prerequisites, corequisites, and/or recommended prep) are available at: <http://go.hawaii.edu/aij>.

## Mathematics (MATH) Classes

### MATH 16 : Math Study Skills

**Credits:** 1

**Class Hours:** 1 lecture

**Comments:** This course is credit (C) or no credit (NC).

**Description:** Students in MATH 16 study and apply essential study skills needed to succeed in mathematics and other mathematics-related courses. Techniques are introduced to reduce math anxiety, improve note-taking skills, manage time effectively, employ effective study techniques, and practice sound math test-taking skills.

**Semester Offered:** Fall, Spring

**Course Student Learning Outcomes (CSLOs):**

1. Demonstrate number sense.
2. Apply methods to improve their ability to learn mathematics.
3. Apply organizational skills and appropriate study habits.

### MATH 75X : Introduction to Mathematical Reasoning

**Credits:** 4

**Class Hours:** 4 lecture

**Description:** This course prepares students for MATH 100, MATH 111, and MATH 115. Course topics include ratio and percent, unit conversion, graphs, data interpretation, basic algebra, solving linear equations, and working with formulas with special emphasis on pattern recognition and problem solving. This course will emphasize the importance of a growth mindset and number sense.

**Semester Offered:** Fall, Spring

**Course Student Learning Outcomes (CSLOs):**

1. Demonstrate number sense through estimation, mental arithmetic, and ordering of numbers.
2. Perform operations with integers, rational numbers, and variable expressions.
3. Demonstrate understanding of and implement the ideas of growth mindset to increase the learning of mathematics.
4. Recognize and express mathematical patterns in various forms and contexts.
5. Solve applied mathematical problems, judge reasonableness of results, and communicate conclusions using appropriate terminology and symbols.

### MATH 82X : Expanded Algebraic Foundations

**Credits:** 5

**Class Hours:** 5 lecture

**Prerequisites:** Appropriate math placement.

**Description:** This covers elementary algebra topics. Topics include linear equations and inequalities, graphing, linear systems, properties of exponents, operations on polynomials, factoring, rational and radical expressions and equations, quadratic equations, and applications. Additional topics may include graphing by transformation, introduction to logarithms and functions, and dimensional analysis.

**Semester Offered:** Fall, Spring

**Course Student Learning Outcomes (CSLOs):**

1. Use algebraic techniques to analyze and solve applied problems.
2. Solve equations, inequalities, and systems of equations.
3. Graph linear and quadratic equations.

## MATH 88 : College Algebra Companion

**Credits:** 2

**Class Hours:** 2 lecture

**Prerequisites:** Appropriate math placement.

**Corequisite Courses:**

MATH 103

**Comments:** This course is credit (C) or no credit (NC).

**Description:** MATH 88 provides students with supplemental algebra instruction that directly supports the topics covered in MATH 103.

**Semester Offered:** Fall, Spring

**Course Student Learning Outcomes (CSLOs):**

1. Demonstrate algebra skills needed to be successful in MATH 103.

## MATH 100 : Survey of Mathematics

**Credits:** 3

**Class Hours:** 3 lecture

**Prerequisites:** "C" or higher in MATH 75X or MATH 82X; or acceptable math placement.

**Description:** This course offers a nontechnical survey of mathematical concepts and techniques enjoying applications in the daily life of our society. Topics chosen are from the areas of arithmetic, algebra, computers, geometry, logic, probability, and statistics.

**Semester Offered:** Fall, Spring

**Designation:**

Foundations (Quantitative Reasoning) – FQ

**Course Student Learning Outcomes (CSLOs):**

1. Use logic to identify valid and invalid argument forms, and analyze conclusions drawn through various types of reasoning.
2. Apply the principles of problem solving to mathematical problems, including those requiring quantitative methods, and effectively communicate procedures and results.

## MATH 103 : College Algebra

**Credits:** 3

**Class Hours:** 3 lecture

**Prerequisites:** "C" or higher in MATH 82X or acceptable math placement.

**Description:** MATH 103 is a continuation from Elementary Algebra. Topics of study include exponents; algebraic equations and inequalities; absolute value; polynomial, rational, radical, exponential and logarithmic functions; circles; and systems of equations and inequalities.

**Semester Offered:** Fall, Spring

**Designation:**

Foundations (Quantitative Reasoning) – FQ

**Course Student Learning Outcomes (CSLOs):**

1. Apply algebraic concepts to model, solve and provide justifications to problems involving linear, quadratic, polynomial, rational, radical, exponential, logarithmic equations, and/or inequalities.
2. Perform operations on functions and find inverses.
3. Graph functions using tables, transformations, critical points, and other characteristics.

## MATH 111 : Math for Elementary Teachers I

**Credits:** 3

**Class Hours:** 3 lecture

**Prerequisites:** Qualified for ENG 100. "C" or higher in MATH 75X or MATH 82X; or acceptable math placement.

**Comments:** This course is intended for prospective elementary education majors only.

**Description:** This course teaches students to communicate and represent mathematical ideas, how to solve problems, and how to reason mathematically. Material covered includes operations and their properties, sets, counting, patterns, and algebra.

**Semester Offered:** Fall, Spring

**Course Student Learning Outcomes (CSLOs):**

1. Obtain information about mathematical concepts and principles (such as properties of sets, place value, number systems, operations, and elementary number theory ) from materials written in words and in symbols.
2. Identify connections between familiar mathematical problems and model them in different contexts.
3. Apply abstract and quantitative reasoning skills to solve mathematical problems.
4. Communicate mathematical concepts coherently, clearly, and precisely, both in words and in symbols.

## MATH 112 : Math for Elementary Teachers II

**Credits:** 3

**Class Hours:** 3 lecture

**Prerequisites:** "C" or higher in MATH 111.

**Comments:** This course is intended for prospective elementary education majors only.

**Description:** This course deals with representations of and operations on the natural numbers, integers, rational numbers, and real numbers. It also explores properties of those operations.

**Semester Offered:** Fall, Spring

**Designation:**

Foundations (Quantitative Reasoning) – FQ

**Course Student Learning Outcomes (CSLOs):**

1. Apply abstract and quantitative reasoning skills to solve mathematical problems.
2. Obtain information about mathematical concepts and principles (such as measurement and data; ratio and proportion; probability; and geometry) from materials written in words and in symbols.
3. Communicate mathematical concepts coherently, clearly, and precisely, both in words and in symbols.
4. Identify connections between familiar mathematical problems and model them in different contexts.

## MATH 115 : Introduction to Statistics and Probability

**Credits:** 3

**Class Hours:** 3 lecture

**Prerequisites:** "C" or higher in MATH 75X or MATH 82X; or acceptable math placement.

**Description:** This course utilizes basic statistical topics including measures of central tendency and dispersion, classification of variables, sampling techniques, elementary probability, normal and binomial probability distributions, tests of hypothesis, linear regression and correlation in order to solve problems.

**Semester Offered:** Fall, Spring

**Designation:**

Foundations (Quantitative Reasoning) – FQ

**Course Student Learning Outcomes (CSLOs):**

1. Calculate and interpret descriptive statistics, including the mean, median, mode, and standard deviation of single-variable data and the correlation and regression coefficients of paired-variable data.
2. Calculate and interpret probabilities for an event in a probability experiment.
3. Construct and interpret point and interval estimates, and apply appropriate techniques to execute and interpret hypothesis tests and effectively communicate procedures and results.

## MATH 135 : Pre-Calculus: Elementary Functions

**Credits:** 3

**Class Hours:** 3 lecture

**Prerequisites:** "C" or higher in MATH 103 or acceptable math placement.

**Description:** Students in this course study the operations with, the inverse of, and the multiple representations of functions, including but not limited to linear; quadratic; polynomial; rational; exponential; and logarithmic. Appropriate use of technology is incorporated to enhance the conceptual understanding of mathematics. This course is recommended to students who are pursuing further studies in business, engineering, mathematics and/or sciences.

**Semester Offered:** Fall, Spring

## MATH 140 : Pre-Calculus: Trigonometry and Analytic Geometry

**Credits:** 3

**Class Hours:** 3 lecture

**Prerequisites:** "C" or higher in MATH 135 or acceptable math placement.

**Description:** The second part of the Pre-Calculus sequence, this course includes a study of trigonometry, analytic geometry and applications.

**Semester Offered:** Fall, Spring

## MATH 140X : PreCalculus

**Credits:** 4

**Class Hours:** 4 lecture

**Prerequisites:** "C" or higher in MATH 103 or acceptable placement.

**Description:** MATH 140X will provide students with essential precalculus skills needed in Calculus. Topics of study include, but are not limited to: trigonometric concepts including trigonometric functions, solving triangles, inverse trigonometric functions, solving trigonometric equations, proving trigonometric identities, and applications of trigonometry such as vectors and polar coordinates; and algebraic concepts including graphing polynomials and rational functions. Additional topics may include an introduction to logic and proof, analytic geometry, complex polar representation, summation (sigma) notation, and limits.

**Semester Offered:** Fall, Spring

**Designation:**

Foundations (Quantitative Reasoning) – FQ

**Course Student Learning Outcomes (CSLOs):**

1. Evaluate and simplify algebraic and trigonometric expressions by applying appropriate formal rules or algorithms.
2. Construct proofs using trigonometric identities.
3. Apply theory from algebra, trigonometry and analytic geometry to symbolically model and solve various real world application problems.
4. Select and correctly utilize precise mathematical language and symbols to effectively communicate procedures and results.
5. Analyze and graph functions and equations involving algebra, trigonometry, and analytic geometry.

## MATH 241 : Calculus I

**Credits:** 4

**Class Hours:** 4 lecture

**Prerequisites:** "C" or higher in MATH 140X or acceptable math placement.

**Description:** This course focuses on limits and continuity, techniques and applications of differentiation of algebraic and trigonometric functions, and an introduction to integration.

**Semester Offered:** Fall

**Designation:**

Foundations (Quantitative Reasoning) – FQ

**Course Student Learning Outcomes (CSLOs):**

1. Use proper symbolic notation and language to communicate mathematical reasoning.
2. Apply the concept of derivative as rate of change to solve realistic problems in related rates, optimization, and linear approximation.
3. Compute limits, derivatives, and antiderivatives of elementary functions.

## MATH 242 : Calculus II

**Credits:** 4

**Class Hours:** 4 lecture

**Prerequisites:** "C" or higher in MATH 241 or acceptable math placement.

**Description:** This course offers the opportunity to study integral calculus, transcendental functions, and series representation of functions. Applications include finding the balancing point of an object, computing the force on submerged objects, and modeling population growth, radioactive decay, and the temperature of a heating or cooling object.

**Semester Offered:** Spring

**Designation:**

Foundations (Quantitative Reasoning) – FQ

**Course Student Learning Outcomes (CSLOs):**

1. Compute definite and indefinite integrals.
2. Apply the concept of integral to solve realistic problems.
3. Apply series representation of functions to approximate values of functions and to simplify formulas.
4. Use proper symbolism and language to communicate mathematical reasoning.

## MATH 243 : Calculus III

**Credits:** 3

**Class Hours:** 3 lecture

**Prerequisites:** "C" or higher in MATH 242 or acceptable math placement.

**Description:** This course covers vector algebra, vector-valued functions, differentiation of functions of several variables, and optimization.

**Semester Offered:** Fall

**Course Student Learning Outcomes (CSLOs):**

1. Model and solve applications problems involving vector algebra and differentiation of multivariable functions.
2. Algebraically manipulate vectors and vector-valued functions.
3. Analyze basic 3-dimensional surfaces and paths.

## MATH 244 : Calculus IV

**Credits:** 3

**Class Hours:** 3 lecture

**Prerequisites:** "C" or higher in MATH 243 or acceptable math placement.

**Description:** This course covers multiple integrals; line integrals and Green's Theorem; surface integrals; and Stokes's and Gauss's Theorems.

**Semester Offered:** Spring

**Course Student Learning Outcomes (CSLOs):**

1. Integrate multivariable functions in various coordinate systems.
2. Select and correctly utilize precise mathematical language and symbols to effectively communicate procedures and results.
3. Use multiple integrals to solve application problems, such as those involving Green's, Stokes's, and Gauss's Theorems.

## MATH 245 : Multivariable Calculus

**Credits:** 4

**Class Hours:** 4 lecture

**Prerequisites:** "C" or higher in MATH 242 or acceptable math placement.

**Description:** This course covers multivariable differential and integral calculus, including vector-valued functions, optimization, multiple integrals, and theorems on integration in vector fields.

**Semester Offered:** Fall, Spring

**Course Student Learning Outcomes (CSLOs):**

1. Analyze basic 3-dimensional surfaces and paths.
2. Model and solve application problems involving vector algebra and differentiation of multivariable functions.
3. Integrate multivariable functions in various coordinate systems.
4. Use multiple integrals to solve application problems such as those involving Green's, Stokes's, and Gauss's Theorems.
5. Select and correctly utilize precise mathematical language and symbols to effectively communicate procedures and results.