

■ Mathematics

Program Advisors: Dr. Chock Wong, Dr. James W. Miller

The mission of the Mathematics Program is to promote mathematical literacy and prepare students for careers in pure and applied mathematics, statistics, mathematics education, and other professions that require a mathematics background. In the modern world, mathematical literacy is essential in order to perform jobs well. To respond to the needs for the mathematically literate graduates and to ensure the effectiveness of learning, every Chaminade student is required to take a mathematics course specified according to his or her major. (See the three tracks of mathematics requirements under the general education requirements.) New and transfer students are expected to take a mathematics placement test which is given to place students at the appropriate level of mathematics courses.

Learning Outcomes for the Minor in Mathematics

The Program Outcomes for the Mathematics Minor at Chaminade are as follows:

1. To demonstrate the understanding and skills in reading, interpreting and communicating mathematical contents which are integrated into other disciplines or appear in everyday life.
2. To gain understanding of, and practical skills in, and logical thinking, deductive and inductive reasoning.
3. To articulate the understanding of more advanced mathematical concepts and quantitative skills to support the study of other disciplines, including skills with numeric and symbolic computations, and problem solving using numeric, analytic and graphic methods.
4. Where relevant, to develop mathematical maturity in order to undertake higher-level studies in mathematics and related fields.

Currently a minor in mathematics is offered.

Pre-minor requirements: MA 210 and MA 211.

Minor requirements: 12 semester hours of upper division courses in mathematics. Students who plan to become secondary school teachers of mathematics should include MA 331, MA 401 and MA 490 in their program.

Course Descriptions

Mathematics (MA)

MA 098 Basic Mathematics (3)

Three class hours per week. Improvement of basic arithmetic skills and introduction to algebra. Required of all entering students as determined by performance on the mathematics placement examination. Offered every semester.

MA 100 Survey of Mathematics (3)

Mathematical thought is studied through interactions between the foundations of knowledge and the study of the nature of both algebra and geometry. Issues of mathematical thought are addressed through selected studies of the nature of sets, logic, numbers and operations, algebra, geometry, measurement, financial management, probability, statistics, graphs and functions and mathematical systems. This course fulfills the Track A general education requirement in mathematics. The course is intended as a terminal course and is not a prerequisite for any other course in mathematics. Offered every semester. Prerequisites: MA 098 or placement.

MA 102 Introductory Algebra (3)

Introductory algebra. Real numbers and their basic properties, polynomials, factoring, rational expressions, simple radicals, square roots and cube roots, linear equations and inequalities, lines in the plane, systems of linear equations, applications of equations (word problems). Credits not applicable towards the general education requirement in mathematics for any degree. Offered every semester in the Adult Evening and Online Program.

MA 103 College Algebra (3)

Algebra knowledge and skills for college studies: Sets and real number system; exponents and polynomials, rational and radical expressions; equations and inequalities with applications, including equations containing rational or radical expressions and systems of equations; beginning analytic geometry and functions; exponential and logarithmic functions; the binomial theorem, and progressions. Fulfills Track B general education requirement in mathematics. Not open to students with credits in MA 110, MA 210, or other higher numbered mathematics courses. Offered every semester. Prerequisites: MA 098, MA 102 or placement.

MA 105 Mathematics for Elementary School Teachers (3)

This course is a foundation for prospective early childhood and elementary education majors with pre-K to 8 mathematics. Guided by NCTM Standards and through the study of concepts and properties of number systems; the four fundamental operations of arithmetic; the basic knowledge in data; the shapes, measurement and transformation of geometric figures; and basic concepts in pre-algebra, the student will be able to undertake further study in mathematics education. Offered every semester. This course fulfills the general education requirement in mathematics for Early Childhood Education and Elementary Education majors. Prerequisites: MA 098 or placement.

MA 110 Pre-Calculus (3)

Foundation for further study in mathematics. Primarily the preparatory course for MA 210. Topics include polynomials in general, functions and inverse functions, functions and graphs, exponential and logarithmic functions, trigonometric functions and their inverses, the binomial theorem, mathematical induction, all complex numbers. Not open to students with credit in MA 210 or higher courses. Offered every semester. Prerequisites: MA 103 or placement.

MA 210 Calculus I (4)

The first course in the calculus sequence. Topics include limits, differentiation and integration of single variable functions which include polynomials, rational powers, and trigonometric functions, the mean value theorem, and the fundamental theorem of calculus. Both concepts and techniques as well as application will be stressed. Fulfills Track C general education requirement in mathematics. Offered every semester. Prerequisites: MA 110 or equivalent or placement.

MA 211 Calculus II (4)

Continuation of MA 210. Differentiation and integration of transcendental functions including exponential, logarithmic, and inverse trigonometric functions, and more techniques of integration make up the first part of the course. The second part covers topics in sequences and series, limits of sequences, l'Hopital's rule, convergence and divergence of series, Taylor series, and general discussion of power series. Offered annually. Prerequisites: MA 210 or equivalent or placement.

English 102 and COM 101 are prerequisites for all upper division courses**MA 301 Number Theory (3)**

Congruences, divisibility and primes, quadratic reciprocity, quadratic residues, the Legendre and Jacobi symbols, elementary number theoretic functions, Diophantine equations, and recurrence functions. Recommended for secondary mathematics education program.

MA 305 Mathematics for Elementary Teachers II (3)

This course provides prospective elementary education majors with a deeper and more comprehensive understanding of the fundamental concepts underlying the mathematics taught in grades K through 8. Guided by NCTM Principles and Standards, this course focuses on the big ideas of geometry, measurement, data analysis, probability and statistics. Offered spring semester. This course fulfills an upper division elective requirement in mathematics for Elementary Education majors. Prerequisites: MA 105.

MA 308 Discrete Mathematics (3)

Symbolic logic, sets and relations, algorithms, mathematical induction, counting techniques in combinatorics, recurrence relations, trees and other graphs, and other topics. Recommended for secondary mathematics education and computer and information science programs. Offered annually. Prerequisites: MA 110 or equivalent.

MA 311 Calculus III (4)

Calculus of functions of several variables. Polar coordinates, parametric equations, vectors and vector calculus, plane and space curves, partial derivatives, directional derivatives and gradients, extreme values and second-partials test, double and triple integrals, cylindrical and spherical coordinates, and Green's and Stoke's theorems. Offered annually. Prerequisites: MA 211 or equivalent.

MA 313 Differential Equations (3)

Study of ordinary differential equations leading to solutions by series. Topics also include Laplace transformations and introduction to partial differential equations. Offered annually. Prerequisites: MA 211 or equivalent.

MA 331 Introduction to Probability and Statistics (3)

Sample space, random variables, classical distributions, the central limit theorem, estimation, testing of hypotheses for parameters, the first and the second kinds of errors, correlations, regressions, and analysis of variance. Offered annually. Prerequisites: MA 110 or equivalent or placement.

MA 401 Linear Algebra (3)

Matrices, elementary row operations, vector spaces, linear transformations, determinants, applications to system of linear equations, bases and orthonormal bases, eigenvalues, and eigen vectors. Offered annually. Prerequisites: MA 110 or equivalent.

MA 402 Abstract Algebra (3)

Introduction to groups, rings, and fields. Offered alternate years. Prerequisites: MA 401 or consent of instructor; MA 301 is recommended but not required.

MA 411 Advanced Calculus I (3)

Theories on the real number system, limits, continuity, properties of continuous functions, theory of differentiation and integration, and infinite series. Restricted to one variable. Offered alternate years, according to demand. Prerequisite: MA 311, or consent of instructor.

MA 425 Topology (3)

Introduction to point-set topology. Topics include neighborhoods, open and closed sets, compactness, connectedness, separability conditions, metrizable spaces, complete spaces, mapping, continuity of mappings, and homeomorphisms. Not regularly offered. Prerequisite: MA 411 or consent of instructor.

MA 180/280/380 480 Special Topics (1-3)

Selected topics in mathematics to prepare students for specific career paths or graduate study. May be repeated for credit.

MA 490 Seminar (1)

Readings and discussion of selected topics. Minimum of one oral presentation by participant required. Repeatable for credit. Offered annually.