# **MATHEMATICS (MA)**

# MA-105 Survey of Mathematics

# LASC Categories: QR

**Prerequisites:** Math placement exam code 3 or higher, or a weighted high school GPA of 2.7 or higher within the past 3 years

Financial management, probability theory, voting methods and apportionment, and other topics selected to improve the quantitative literacy of students. Not for mathematics majors. Fall and Spring and every year. 3 Credits

MA-107 Mathematical Explorations-- Invitation To Effective Thinking LASC Categories: QR

**Prerequisites:** Math placement exam code 3 or higher, or a weighted high school GPA of 2.7 or higher within the past 3 years.

Analysis of mathematical topics including (but not limited to) logical thinking, elementary number theory, concepts of infinity, geometry gems, modeling through graphs, fractals, and uncertainty. Fall and Spring and every year. 3 Credits

Fail and Spring and every year. 3 Credits

# MA-130 Number and Operations for Teachers LASC Categories: QR

**Prerequisites:** Pass math placement test with code 5 or above Develops understanding of the mathematical content of number and operations at the deep level required for successful elementary and middle school teaching.

Fall and Spring and every year. 3 Credits

# MA-131 Patterns, Functions and Algebra for Teachers LASC Categories: QR

## Prerequisites: MA-130 Minimum grade C

Develops understanding of the mathematical content of patterns, functions and alegebra at the deep level required for successful elementary and middle school teaching. Credit will not be awarded for MA-180 (formerly MA-110) and MA 131. Fall and Spring and every year. 3 Credits

# MA-132 Geometry, Measurement, Probability and Statistics for Teachers LASC Categories: QR

# Prerequisites: MA-130 with a C or above.

Develops understanding of the mathematical content of geometry, measurement, probability and statistics at the deep level required for successful elementary and middle school teaching. Fall and Spring and every year. 3 Credits

# MA-150 Statistics I

# LASC Categories: QR

**Prerequisites:** Pass Math Placement Test with code 4 or above Descriptive techniques, elementary probability, distribution of the sample mean, confidence intervals, hypothesis testing of the means of one and two samples, linear regression and correlation. Credit will not be awarded for both MA-150 and MA-302.

Fall and Spring and every year. 3 Credits

# **MA-180 Introduction to Functions**

# LASC Categories: QR

**Prerequisites:** Pass math placement exam with a score of 5 or above. Properties, graphing, and applications of linear, quadratic, polynomial, rational, exponential, and logarithmic functions; systems of linear equations.

Fall and Spring and every year. 3 Credits

# MA-190 Pre-calculus

# LASC Categories: QR, NLL

**Prerequisites:** MA 110 or MA-180 with a grade of at least C- or math placement exam code 6 or above

Review of exponential and logarithmic functions; trigonometric functions, identities, and equations; systems of linear equations and inequalities; and applications.

Fall and Spring and every year. 4 Credits

## MA-193 Special Topics in Math for First Year Students LASC Categories: FYS

Introductory level course covering topics of special interest to first year students. Offered only as a First Year Seminar. 3 Credits

# MA-200 Calculus I

LASC Categories: QR, NLL

Prerequisites: MA 190 with a grade of at least C- or math placement exam code 7

Limits, continuity, differentiation and integration of functions, the Fundamental Theorem of Calculus, L'Hôpital's Rule, applications including related rates, optimization, and area. Credit willnot be given for both MA-200 and MA-202.

Fall and Spring and every year. 4 Credits

# MA-201 Calculus II

## LASC Categories: QR, NLL

Prerequisites: MA 200 with a grade of at least C-

Techniques of integration, infinite sequences and series, power series, applications including volume and functional approximation. Fall and Spring and every year. 4 Credits

# MA-202 Business Calculus

# LASC Categories: QR, NLL

**Prerequisites:** MA-180 with a grade of at least C- or math placement exam code 6 or above

Review of functions, limits, derivatives, integration and introduction to multivariate calculus. Business applications of these topics. Fall and Spring and every year. 4 Credits

# MA-240 Theory of Proof

# LASC Categories: NLL

Prerequisites: MA-200 minimum grade C-

Logic and Proof, Set Theory, Math Induction, Relations, Functions, Sequences and Convergence, Limits and Continuity, Congruences, Introductions to Groups.

Fall and Spring and every year. 4 Credits

# MA-260 Linear Algebra

**Prerequisites:** MA 240 with a grade of at least C. Solutions of simultaneous equations by means of matrices and determinants; vector spaces, linear transformations; also, as time permits, characteristic values, bilinear and quadratic forms.

Fall only and every year. 3 Credits

# **MA-302** Probability and Statistics

**Prerequisites:** MA 200 with a grade of at least C-Descriptive statistics, probability theory, combinatorics, correlation, regression and inference techniques. Credit will not be awarded for both MA-150 and MA-302.

Fall only and every year. 3 Credits

# MA-303 Mathematical Modeling

**Prerequisites:** MA 201 with a grade of at least C-The development, analysis, and application of continuous and discretetime models from the physical, financial, and life sciences. Spring only and every year. 3 Credits

# MA-304 Data Analysis

## LASC Categories: NLL

**Prerequisites:** MA-302 CS-135 Minimum grade C-; Case studies combining applied statistics, mathematical statistics, mathematics, computing, and communications to simulate work experience of a practicing statistician. Spring only and every year. 4 Credits

# MA-309 Topics in Mathematics for Middle and Secondary Teachers

**Prerequisites:** MA 240 with a grade of C or better. MA 340 is highly recommended.

Students will strengthen and expand their knowledge of the mathematics taught in middle/high school. Specific emphasis will be placed on topics in geometry and trigonometry.

Spring only and every year. 3 Credits

# MA-310 Calculus III

#### LASC Categories: NLL

**Prerequisites:** MA 201 with a grade of at least C-Vectors, parametric equations, polar, cylindrical and spherical coordinates, multivariable functions, properties and applications, partial derivatives, multiple integrals. Fall only and every year. 4 Credits

## **MA-320 Ordinary Differential Equations**

**Prerequisites:** MA-201 with a grade of at least B-. Techniques for solving first- and second-order ordinary differential equations, including Laplace transformations, numerical approximations and graphical techniques.

Spring only and every year. 3 Credits

# MA-327 Combinatorics and Graph Theory

## Prerequisites: MA-240 with a grade of C or above.

The course will examine various topics from combinatorics and graph theory, including enumeration, recurrence relations, generating functions, graphs and their properties (e.g., planarity, colorability), and trees. The course will have an emphasis on both proof writing and computation. Spring only and every year. 3 Credits

## MA-340 Modern Geometry

**Prerequisites:** MA 240 with a grade of at least C. Topics from Euclidean and non-Euclidean geometry. Spring only and every year. 3 Credits

## MA-360 Number Theory

**Prerequisites:** MA 240 with a grade of at least C. Divisibility properties of integers, prime numbers, the Euclidean algorithm, the unique factorization theorem, congruences, Diophantine equations, number theoretic functions. Fall only and every year. 3 Credits

## MA-380 Probability

**Prerequisites:** MA 310 with a grade of at least C-Probability concepts including: counting, conditional probability,

independence, expectation and variance of univariate and multivariate distributions. This is the first course in a two-course sequence that prepares students for the first actuarial exam. Fall only and every year. 3 Credits

## MA-382 Actuarial Preparation Workshop

**Prerequisites:** MA-310 with a B- or greater and approval of Math Chair This course supports students as they prepare for either of the following actuarial exams: Probability Exam P or Financial Mathematics Exam FM. Focus will be on developing the required mathematical competencies, professionalism and communication of mathematical concepts consistent with actuarial industry standard, networking towards the acquisition of an internship or job in the actuarial field. Spring only and every year. 3 Credits

## MA-405 Abstract Algebra

**Prerequisites:** MA 240 with a grade of at least B- and MA 260 with a grade of at least C-.

Introduction to groups, rings, and fields. Spring only and every year. 3 Credits

## MA-408 Directed Study: Mathematics

Directed study offers students, who because of unusual circumstances may be unable to register for a course when offered, the opportunity to complete an existing course with an established syllabus under the direction and with agreement from a faculty member. 1-6 Credits

## MA-410 Real Analysis

**Prerequisites:** MA 310 and MA-240 with a grade of at least B-Rigorous treatment of sequences, topology of the real numbers, continuity; also, as time allows, differentiation, integration. Fall only and every year. 3 Credits

# **MA-425 Mathematical Statistics**

**Prerequisites:** MA-240 and MA-310 with a minimum grade of B-, and MA-380 with a minimum grade of C-

A rigorous treatment of statistical inference including: maximum likelihood estimators, sufficiency, consistency, hypothesis tests, likelihood ratio tests and Bayesian inference. Spring only and every year. 3 Credits

## **MA-470 Capstone Experience**

## LASC Categories: CAP, WAC

**Prerequisites:** Senior standing within the major. EN-102 or EN-250 Students complete an independent mathematics research/problemsolving project, including oral presentations and a final written paper. Fall only and every year. 3 Credits

## MA-497 Selected Topics in Mathematics

**Prerequisites or Corequisite:** MA-240 and MA-260 (MA-260 may be taken concurrently). Pre-requisite will vary according to content. Selection of topics of mutual interest to students and faculty. 3 Credits

## MA-498 Internship: Mathematics

Working in and for an organization where ones skills can be tested in realworld situations. Students will have an opportunity to gain experience, to increase knowledge in various functional areas, and establish important contacts with an organization. [Consent of instructor.] 3 Credits

## **MA-499 Independent Study in Mathematics**

Offers advanced students an opportunity to examine topics not normally covered in other mathematics courses. Geared to interests of both the student and the instructor.

Fall and Spring and every year. 1-6 Credits