Summer Sessions

The UCLA Math Department is offering the following courses for the 2016 Summer Session:

Session A (six week):

- 1, 3A, 3C, 31A, 32A, 33A
- 61
- 110A, 115A, 131A, 132, 134, 135, 142, 164, 167, 170A, 172A, 174E

Session A (eight week):

- PIC 10A

Session C (six week):

- 3B, 31B, 32B, 33B, 95
- 115A, 131A, 142, 170B, 172A

Please consult the UCLA Summer 2016 Schedule of Classes for more information:

www.summer.ucla.edu

Check out MATH 95! This class helps math majors transition into upper division courses.

LOWER DIVISION COURSES

MATH 1: PRECALCULUS. Function concept. Linear and polynomial functions and their graphs, applications to optimization. Inverse, exponential, and logarithmic functions. Trigonometric functions.

MATH 3A: CALCULUS FOR LIFE SCIENCE STUDENTS. Modeling with functions, limits, and derivatives, decisions and optimization in biology, derivative rules and tools .

MATH 3B: CALCULUS FOR LIFE SCIENCE STUDENTS. Applications of differentiation, integration, differential equations, linear models in biology, phase lines and classifying equilibrium values, bifurcations.

MATH 3C: PROBABILITY FOR LIFE SCIENCE STUDENTS. Multivariable modeling, matrices and vectors, eigenvalues and eigenvectors, linear and nonlinear systems of differential equations, probabilistic applications of integration.

MATH 31A: CALCULUS AND ANALYTIC GEOMETRY. Differential calculus and applications; introduction to integration.

MATH 31B: CALCULUS AND ANALYTIC GEOMETRY. Transcendental functions; methods and applications of integration; sequences and series.

MATH 32A: CALCULUS OF SEVERAL VARIABLES. Introduction to differential calculus of several variables, vector field theory.

MATH 32B: CALCULUS OF SEVERAL VARIABLES. Introduction to integral calculus of several variables, line and surface integrals.

MATH 33A: LINEAR ALGEBRA AND APPLICATIONS. Introduction to linear algebra: systems of linear equations, matrix algebra, linear independence, subspaces, bases and dimension, orthogonality, least-squares methods, determinants, eigenvalues and eigenvectors, matrix diagonalization, and symmetric matrices.

MATH 33B: DIFFERENTIAL EQUATIONS. First-order, linear differential equations; second-order, linear differential equations with constant coefficients; power series solutions; linear systems.

MATH 61: INTRODUCTION TO DISCRETE STRUCTURES. Discrete structures commonly used in computer science and mathematics, including sets and relations, permutations and combinations, graphs and trees, induction.

MATH 95: TRANSITION TO UPPER DIVISION MATHEMATICS. Introduction to rigorous methods of proof-based upper division mathematics courses. Basic logic; structure of mathematical proofs; sets, functions, and cardinality; natural numbers and induction; construction of real numbers; topology of real numbers; sequences and convergence; continuity. (OFFERED ONLY IN THE SUMMER!)

PIC 10A: INTRODUCTION TO PROGRAMMING. Basic principles of programming, using C++; algorithmic, procedural problem solving; program design and development; basic data types, control structures and functions; functional arrays and pointers; introduction to classes for programmer-defined data types.

UPPER DIVISION COURSES

MATH 110A: ALGEBRA. Ring of integers, integral domains, fields, polynomial domains, unique factorization.

MATH 115A: LINEAR ALGEBRA. Techniques of proof, abstract vector spaces, linear transformations, and matrices; determinants; inner product spaces; eigenvector theory.

MATH 131A: ANALYSIS. Rigorous introduction to foundations of real analysis; real numbers, point set topology in Euclidean space, functions, continuity.

MATH 132: COMPLEX ANALYSIS FOR APPLICATIONS. . Introduction to basic formulas and calculation procedures of complex analysis of one variable relevant to applications. Topics include Cauchy/Riemann equations, Cauchy integral formula, power series expansion, contour integrals, residue calculus.

MATH 134: LINEAR AND NONLINEAR SYSTEMS OF DIFFERENTIAL EQUATIONS. Dynamical systems analysis of nonlinear systems of differential equations. One- and two- dimensional flows. Fixed points, limit cycles, and stability analysis. Bifurcations and normal forms. Elementary geometrical and topological results. Applications to problems in biology, chemistry, physics, and other fields.

MATH 135: ORDINARY DIFFERENTIAL EQUATIONS. Selected topics in differential equations. Laplace transforms, existence and uniqueness theorems, Fourier series, separation of variable solutions to partial differential equations, Sturm/Liouville theory, calculus of variations, two-point boundary value problems, Green's functions.

MATH 142: MATHEMATICAL MODELING. Introduction to fundamental principles and spirit of applied mathematics. Emphasis on manner in which mathematical models are constructed for physical problems. Illustrations from many fields of endeavor, such as physical sciences, biology, economics, and traffic dynamics.

MATH 164: OPTIMIZATION. Fundamentals of optimization. Linear programming: basic solutions, simplex method, duality theory. Unconstrained optimization, Newton's method for minimization. Nonlinear programming, optimality conditions for constrained problems. Additional topics from linear and nonlinear programming.

MATH 167: MATHEMATICAL GAME THEORY. Quantitative modeling of strategic interaction. Topics include extensive and normal form games, background probability, lotteries, mixed strategies, pure and mixed Nash equilibria and refinements, bargaining; emphasis on economic examples. Optional topics include repeated games and evolutionary game theory.

MATH 170A: PROBABILITY THEORY. Probability distributions, random variables and vectors, expectation.

MATH 170B: PROBABILITY THEORY. Convergence in distribution, normal approximation, laws of large numbers, Poisson processes, random walks.

MATH 172A. INTRODUCTION TO FINANCIAL MATHEMATICS. Designed to prepare students for Society of Actuaries Financial Mathematics examination. Provides understanding of fundamental concepts of financial mathematics and how those concepts are applied in calculating present and accumulated values from various streams of cash flows as basis for future use in reserving, valuation, pricing asset/liability management, investment income, capital budgeting, and valuing contingent cash flows.

MATH 174E: MATHEMATICS OF FINANCE FOR MATHEMATIC/ECONOMICS STUDENTS. Modeling, mathematics, and computation for financial securities. Price of risk. Random walk models for stocks and interest rates. No-arbitrage theory for pricing derivative securities; Black/Scholes theory. European and American options. Monte Carlo, trees, finite difference methods.