Mathematics

110, Linear Algebra, Spring 2020, Kenneth A. Ribet

Upper-division course on abstract linear algebra. Catalog Description: Matrices, vector spaces, linear transformations, inner products, determinants. Eigenvectors. QR factorization. Quadratic forms and Rayleigh's principle. Jordan canonical form, applications. Linear functionals.
Textbook: Axler, Linear Algebra Done Right, Ch. 1-8, 10

202a, Topology and Measure Theory, Fall 2019, Marc A. Rieffel

Graduate course in analysis. Catalog Description: Metric spaces and general topological spaces, compactness, theorems of Tychonoff, Urysohn, Tietze, locally compact spaces; an introduction to general measure spaces and integration of functions on them, with Lebesgue measure on the real line as a key example; Banach spaces of functions, and the very beginnings of functional analysis.

202b, Functional Analysis, Spring 2020, Marc A. Rieffel

Graduate course in analysis. Catalog Description: The Hahn-Banach Theorem, duals of Banach spaces and weak topologies, Krein-Milman Theorem, Hilbert spaces, the Radon-Nikodym Theorem, Stone-Weierstrass Theorem, signed measures, Radon measures, operators on Banach and Hilbert spaces, additional topics as time allows.

222a, Partial Differential Equations I, Fall 2020, Daniel Tataru

Graduate analysis course in partial differential equations. Catalog Description: The theory of boundary value and initial value problems for partial differential equations, with emphasis on nonlinear equations. Laplace's equation, heat equation, wave equation, nonlinear first-order equations, conservation laws, Hamilton-Jacobi equations, Fourier transform, Sobolev spaces.
Textbook: Evans, Partial Differential Equations

250a, Groups, Rings, and Fields, Fall 2019, Richard E. Borcherds

Graduate course in algebra. Catalog Description: Group theory, including the Jordan-Holder theorem and the Sylow theorems. Basic theory of rings and their ideals. Unique factorization domains and principal ideal domains. Modules. Chain conditions. Fields, including fundamental theorem of Galois theory, theory of finite fields, and transcendence degree.
Textbook: Lang, Algebra Ch. 1-6

250b, Commutative Algebra, Spring 2020, Paul A. Vojta

Graduate course in algebra. Catalog Description: Development of the main tools of commutative and homological algebra applicable to algebraic geometry, number theory and combinatorics.
Textbook: Eisenbud, Commutative Algebra Ch. 1-10

258, Euclidean Harmonic Analysis, Fall 2019, Francis Michael Christ

Graduate course in analysis. Catalog Description: Basic properties of Fourier series, convergence and summability, conjugate functions, Hardy spaces, boundary behavior of analytic and harmonic functions.

Statistics

134, Introduction to Probability, Fall 2019, Adam Lucas

Catalog Description: An introduction to probability, emphasizing concepts and applications. Conditional expectation, independence, laws of large numbers. Discrete and continuous random variables. Central limit theorem. Selected topics such as the Poisson process, Markov chains, characteristic functions.
Textbook: Pitman, Probability

150, Stochastic Processes, Fall 2020, Brett T Kolesnik

Catalog Description: Random walks, discrete time Markov chains, Poisson processes. Further topics such as: continuous time Markov chains, queueing theory, point processes, branching processes, renewal theory, stationary processes, Gaussian processes.
Textbook: Karlin, Pinsky, Introduction to Stochastic Modeling

205a, Probability Theory I, Fall 2020, Shirshendu Ganguly

Graduate course in probability theory. Catalog Description: Measure theory concepts needed for probability. Expection, distributions. Laws of large numbers and central limit theorems for independent random variables. Characteristic function methods. Conditional expectations, martingales and martingale convergence theorems. Markov chains. Stationary processes. Brownian motion.
Textbook: Durrett, Probability: Theory and Examples

Computer Science

61b, Data Structures, Spring 2020, Paul N. Hilfinger

Catalog Description: Fundamental dynamic data structures, including linear lists, queues, trees, and other linked structures; arrays strings, and hash tables. Storage management. Elementary principles of software engineering. Abstract data types. Algorithms for sorting and searching. Introduction to the Java programming language.

170, Algorithms and Intractable Problems, Fall 2020, Avishay Tal, Umesh Vazirani

Catalog Description: Concept and basic techniques in the design and analysis of algorithms; models of computation; lower bounds; algorithms for optimum search trees, balanced trees and UNION-FIND algorithms; numerical and algebraic algorithms; combinatorial algorithms. Turing machines, how to count steps, deterministic and nondeterministic Turing machines, NP-completeness. Unsolvable and intractable problems.

188, Artificial Intelligence, Summer 2020

Catalog Description: Ideas and techniques underlying the design of intelligent computer systems. Topics include search, game playing, knowledge representation, inference, planning, reasoning under uncertainty, machine learning, robotics, perception, and language understanding.

189, Machine Learning, Fall 2020, Anant Sahai, Jennifer Listgarten, Jitendra Malik

Catalog Description: Theoretical foundations, algorithms, methodologies, and applications for machine learning. Topics may include supervised methods for regression and classification (linear models, trees, neural networks, ensemble methods, instance-based methods); generative and discriminative probabilistic models; Bayesian parametric learning; density estimation and clustering; Bayesian networks; time series models; dimensionality reduction; programming projects covering a variety of real-world applications.