Descriptive List of Statistics and Math Coursework

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All the following courses were at the University of California, Berkeley.

1 Completed Coursework in Statistics

Major GPA: 3.95

1.1 Stat 102: Data, Inference, and Decisions

- Grade: A+
- Instructors: Michael I. Jordan and Fernando Perez
- Subject Matter: False discovery rate, Bayesian hierarchical models, credible intervals, causal inference, experimental design, multi-armed bandits, control, q-learning, two-sided markets, non-parametric methods, differential privacy.

1.2 Stat 154: Modern Statistical Prediction and Machine Learning

- Grade: A
- Instructor: Bin Yu
- Text Used: Gareth James, *An Introduction to Statistical Learning*
- Subject Matter: Theory and practice of statistical prediction. Contemporary methods as extensions of classical methods. Optimal prediction rules, empirical risk, linear regression and classification, basis expansions, regularization, splines, principal component analysis, k-means clustering, Gaussian mixture models, expectation-maximization algorithm, classification and regression trees, support vector machines, kernel methods, boosting, neural networks. Computational efficiency versus predictive performance.

1.3 Stat 153: Time Series

- Grade: A
- Instructor: Jared Fisher
- Text Used: Robert Shumway and David Stoffer, *Time Series Analysis and its Applications*
- Subject Matter: Time series analysis in the time domain and spectral domain. Estimation of trends and seasonal effects, autocorrelation, stationarity, autoregressive integrated moving average models, forecasting, indicators, harmonic analysis, spectra, periodograms, discrete Fourier transforms.

1.4 Stat 151A: Linear Modelling

- Grade: A
- Instructor: Oscar Hernan Madrid Padilla
- Text Used: John Fox, *Applied Regression Analysis and Generalized Linear Models*
- Subject Matter: Linear and generalized linear models. Linear regression, analysis of variance and covariance, random effects, quality improvement, log-linear models for discrete multivariate data, model selection, robustness, graphical techniques, in-depth case studies.

1.5 Stat 150: Stochastic Processes

- Grade: A-
- Instructor: Brett Kolesnik
- Texts Used: Rick Durrett, *Essentials of Stochastic Processes* and Mark A. Pinsky, *An Introduction to Stochastic Modeling*
- Subject Matter: Random walks, discrete and continuous time Markov chains, Poisson processes. Queueing theory, branching processes, renewal theory, Gaussian processes.

1.6 Stat 152: Sampling Surveys

- Grade: A-
- Instructor: Elizabeth Purdom
- Text Used: Sharon L. Loh, *Sampling: Design and Analysis*
- Subject Matter: Theory and practice of sampling from finite populations. Simple random, stratified, cluster, and double sampling. Sampling with unequal probabilities. Properties of various estimators including ratio, regression, and difference estimators. Error estimation for complex samples.

1.7 Stat 135: Concepts of Statistics

- Grade: A+
- Instructor: Hank Ibser
- Texts Used: John A. Rice, *Mathematical Statistics and Data Analysis* and Deborah Nolan, *Stat Labs: Mathematical Statistics through Applications*
- Subject Matter: Statistical theory and methodology. Descriptive statistics, maximum likelihood estimation, non-parametric methods, Optimality, goodness-of-fit tests, analysis of variance, bootstrap and computer-intensive methods and least squares estimation.

1.8 Stat 134: Concepts of Probability

- Grade: A+
- Instructor: Hank Ibser
- Text Used: Jim Pitman, *Probability*
- Subject Matter: Conditional expectation, independence, laws of large numbers. Discrete and continuous random variables. Central limit theorem. The Poisson process, Markov chains, characteristic functions.

1.9 Stat 133: Concepts in Computing with Data

- Grade: A+
- Instructor: Gaston Sanchez
- Subject Matter: Computationally intensive applied statistics. Data manipulation (wrangling, reshaping, tidying). Visualization and graphics. Programming concepts. Data technologies and reporting tools. Dynamic documents.

1.10 Stat C100: Principles and Techniques of Data Science

- Grade: A+
- Instructors: Josh Hug and Fernando Perez
- Text Used: Sam Lau, *Principles and Techniques of Data Science*
- Subject Matter: Statistical inference, measurement error, scalable data processing, machine learning algorthims. Programming for acquiring, transforming, querying and analyzing data.

1.11 Other Completed Statistics Coursework

- Stat C8: Foundations of Data Science (A)

2 Completed Coursework in Mathematics

Major GPA: 3.90

2.1 Math 104: Real Analysis

- Grade: A
- Instructor: Michael Pejic
- Text Used: Kenneth A. Ross, *Elementary Analysis: The Theory of Calculus*
- Subject Matter: The real number system. Sequences, limits, and continuous functions in $\mathbb{R}$ and $\mathbb{R}^n$. Metric spaces. Uniform convergence, interchange of limit operations. Infinite series. Mean value theorem and applications. The Riemann integral.

2.2 Math 110: Linear Algebra

- Grade: A
- Instructor: Zvezdelina Stankova
- Text Used: Stephen H. Friedberg, *Linear Algebra*
- Subject Matter: Matrices, vector spaces, linear transformations, inner products, determinants, operators. Eigenvectors, Cayley-Hamilton Theorem. Quadratic forms, Jordan canonical form, minimal polynomials, applications.

2.3 Math 113: Abstract Algebra

- Grade: A+
- Instructor: Alexander Paulin
- Text Used: Alexander Paulin, *Course Notes* (Link)
- Subject Matter: Sets and relations. The integers, congruences and the Fundamental Theorem of Arithmetic. Groups and their factor groups. Commutative rings, ideals and quotient fields. The theory of polynomials: Euclidean algorithm and unique factorizations. The Fundamental Theorem of Algebra. Fields and field extensions.

2.4 Math 128A: Numerical Analysis

- Grade: A
- Instructor: Jon Wilkening
- Text Used: Richard L. Burden, *Numerical Analysis*
- Subject Matter: Programming for numerical calculations, round-off error, approximation and interpolation, numerical quadrature, matrix computations, and numerical solutions of ordinary differential equations.

2.5 Math 185: Complex Analysis

- Grade: A-
- Instructor: Nicholas Miller
- Text Used: Elias Stein and Rami Shakarchi, *Complex Analysis*
- Subject Matter: Analytic functions of a complex variable. Cauchy's integral theorem, power series, singularities of analytic functions, argument principle, homotopies and simply connected domains, complex logarithm, residue theorem with application to definite integrals, conformal mappings, Schwarz lemma, Riemann mapping theorem.

2.6 Math 170: Mathematical Methods for Optimization

- Grade: B+
- Instructor: Lawrence C. Evans
- Text Used: Joel N. Franklin, *Methods of Mathematical Economics*
- Subject Matter: Linear programming, convex geometry and analysis, Farkas alternative, nonlinear optimization, Karush-Kuhn-Tucker theory, calculus of variations, Euler-Lagrange equations, and optimal control theory.

2.7 Other Completed Math Coursework

- Math 53: Multivariable Calculus (A+)
- Math 54: Linear Algebra and Differential Equations (A+)
- Math 55: Discrete Mathematics (A+)

3 Completed Coursework in Computer Science

3.1 Computer Science 188: Artificial Intelligence

- Grade: A+
- Instructors: Anwar Baroudi and Daniel Fried
- Text Used: Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*
- Subject Matter: Design of intelligent computer systems. Search, game playing, knowledge representation, inference, planning, reasoning under uncertainty, machine learning, robotics, perception, and language understanding.

3.2 Computer Science 182: Designing, Visualizing and Understanding Deep Neural Networks

- Grade: Pass*
- Instructor: John F. Canny
- Text Used: Ian Goodfellow, Yoshua Bengio, and Aaron Courville, *Deep Learning*, and Richard S. Sutton and Andrew G. Barto, *Reinforcement Learning*
- Subject Matter: Convolutional networks, batchnorm, dropout, ensembles, object detection and segmentation. Recurrent networks, LSTMs, visualizing deep networks, attention networks, semantic models for text, natural language translation, transformers, language and dialogue models. Generative, adversarial, and fooling networks, imitation learning, reinforcement learning, policy gradients, neural architecture search, graph networks.

3.3 Info 159: Natural Language Processing

- Grade: Pass*
- Instructor: David A. Bamman
- Text Used: Dan Jurafsky and James Martin, *Speech and Language Processing*, Jacob Eisenstein, *Natural Language Processing*, and Yoav Goldberg, *Neural Network Methods for Natural Language Processing*
- Subject Matter: Text classification, convolutional networks, language modelling, static and contextual word embeddings. Attention, transformer, sequence and part-of-speech tagging, maximum entropy Markov models, conditional random fields. Neural sequence labelling, context-free parsing, dependency parsing, semantic role labelling, word-sense disambiguation. Co-reference resolution, information extraction, question answering, text generation, machine translation.

3.4 Other Relevant Coursework

- Computer Science 61A: Structure and Interpretation of Computer Programs (A-)
- Computer Science 375: Teaching Techniques for Computer Science (Pass)
- Economics 1: Introduction to Economics (A)
- Economics 162: The Chinese Economy (Pass)
- History C184D: Human Contexts and Ethics of Data (Pass*)

***Note:** This coursework was completed in the Spring 2020 semester during the COVID-19 pandemic when the default grades that instructors gave was Pass/No Pass.