Yuelin Li - Analytic/Quantitative Résumé

A. Selected Quantitative Courses at Columbia University

Subject	Course	Details
Math	Introduction to Modern Analysis I&II MATHGU4061-4062 (2019-2020)	**Textbook:** *Principles of Mathematical Analysis*, W. Rudin, Chapter 1-11 **Content:** Real and complex analysis, Point set topology, Continuous and differential functions, Integration, Implicit function theorem, Stokes' theorem, Lebesgue measure and integral.
	Introduction to Modern Algebra I MATHGU4041 (Fall 2020)	**Textbook:** *Algebra*, M. Artin, Chapter 2, 6, 7, *Abstract Algebra,* Dummit and Foote, Chapter 0-6, Handouts from Prof. Robert Friedman **Content:** Groups, Homomorphisms, Rings, Fields, Polynomials, Field extensions, Galois theory.
	Partial Differential Equations MATHV3028 (Spring 2020)	**Textbook:** *Partial Differential Equations: An Introduction*, Walter A. Strauss, Chapter 1-8 **Content:** First-order equations, Linear second-order equations, Separation of variables, Solution by series expansions, Boundary value problems.
	Ordinary Differential Equations MATHV2030 (Fall 2019)	**Textbook:** Handouts from Prof. Florian Johne, *Elementary Differential Equations and Boundary Value Problems*, Boyce and DiPrima, Chapter 1-7, 9, 11 **Content:** Linear theory, Nonlinear equations, Integral transform and series solution techniques, The Banach fixed point theorem, Convergence of the matrix exponential, Applications.
	Linear Algebra MATHV2010 (Fall 2018)	**Textbook:** *Linear Algebra with Applications*, Otto Bretsch, Chapter 1-8 **Content:** Matrices, Vector spaces, Linear transformations, Eigenvalues and eigenvectors, Canonical forms, Applications.
	Supervised Reading MATHV3902 (Spring 2020)	**Textbook:** *Applied Partial Differential Equations*, A. Jeffrey, *Applied Partial Differential Equations*, R. Haberman, Chapter 1-8, 12, 14. **Content:** Weekly meeting and discussion on selected topics.
Applied Math	Computational Inverse Problems APMAE6901 (Spring 2020)	**Textbook:** Handouts from Prof. Kui Ren **Content:** Regression and regularization theory, Iterative schemes for nonlinear inverse problems, Deterministic and randomized minimization schemes, Deep learning with neural networks.
	Computational Math: Numerical Methods APMAE4300	**Textbook:** Handouts from Prof. Marc W. Spiegelman, *Numerical Methods in Engineering with Python 3*, J. Kiusalaas, Chapter 1-10

	(Fall 2020)	**Content:** Errors, Root finding, Optimization, Interpolation, Numerical differentiation, Numerical quadrature, Numerical ODE and PDE, Convergence and stability, Numerical linear algebra.
	Numerical Optimization and Algebra APMAE4990 (Spring 2021)	**Textbook:** *Convex Optimization,* Boyd and Vandenberghe, *Theory, Algorithms, and Applications with MATLAB,* Beck, *Linear and Nonlinear Optimization,* Griva, Nash, and Sofer **Content:** Optimization models, Representation of linear constraints, Linear programming, Unconstrained optimization, Optimality conditions for constrained problems, Feasible-point methods.
	Applied Functional Analysis APMAE4150 (Spring 2021)	**Textbook:** *Applied Analysis*, Hunter and Nachtergaele, *Functional Analysis,* Peter Lax **Content:** Banach and Hilbert spaces, Compactness, Linear operators, Compact operators, Fredholm alternative, Spectrum of linear operators, Spectral theory for self-adjoint compact operators, Applications.
Computer Science	Artificial Intelligence COMSW4701 (Summer 2020)	**Textbook:** *Artificial Intelligence: A Modern Approach*, Russell and Norvig **Content:** State-space problem representations, Problem reduction, And-or graphs, Heuristic search, Predicate calculus, Resolution theorem proving, AI systems and languages for knowledge representation, Machine learning and concept formation.
	Machine Learning COMSW4721 (Spring 2020)	**Textbook:** *Pattern Recognition and Machine Learning,* C. M. Bishop, Chapter 1-7, 9, 12-14.3, *The Elements of Statistical Learning,* Hastie, Tibshirani, and Friedman, Chapter 2, 3, 6, 7, 13, 14, *A Course in Machine Learning,* Daume **Content:** Equivalence of maximum likelihood and least squares estimator, Bias-variance decomposition of mean squared error, Bayes classifier, Nonparametric methods, Gradient descent, Neural networks, Kernel methods, Dimension reduction and manifold learning, Resampling methods, Clustering, Sequential data modeling.
	Introduction to Databases COMSW4111 (Fall 2019)	**Textbook:** *Database System Concepts*, Silberschatz, Korth and Sudarshan **Content:** Entity-relationship modeling, Logical design of relational databases, Relational data definition and manipulation languages, SQL, XML, Query processing, Physical database tuning, Transaction processing, Security.

	Computer Science Theory COMSW3261 (Summer 2020)	**Textbook:** *Introduction to the Theory of Computation*, M. Sisper, Chapter 1-10 **Content:** Deterministic and non-deterministic finite automata, Regular expressions, Context-free grammars, Push-down automata, Turing machines, Chomsky hierarchy, Church-Turing thesis, Complexity Theory and NP-Completeness.
	Discrete Mathematics: Combinatorics and Graph Theory COMSW3203 (Spring 2019)	**Textbook:** *Mathematics: A Discrete Introduction*, Edward R. Scheinerman, Chapter 1-10, Handouts from Prof. Tony Dear **Content:** Logic and formal proofs, Finite probability, Recurrence relations, Sequences and summation, Partial orderings, Graph theory.
	Data Structures with C/C++ COMSW3136 (Spring 2019)	**Textbook:** *The C Programming Language*, Keinighan and Ritchie, *Data Structures and Algorithm Analysis in C++*, Mark A. Weiss **Content:** Programming in **C/C++**, Array based data structures, Heaps, Linked lists, UNIX environment, Trees, Graphs.
	Computing in Context INAFU6006/ COMSW1002 (Fall 2018)	**Textbook:** Handouts from Prof. Adam Cannon and Prof. Scarlett Swerdlow **Content:** Introductory programming, Digital social sciences, finance, public policy, Object-oriented programming, Algorithms, Data cleaning.
	Development Technology COMSW3102 (Fall 2020)	**Content:** Introductory Java, a mixture of lecture/demo and project based Java practice.
Statistics	Probability Theory STATGU4203/ STATGU5203 (Summer 2020)	**Textbook:** *Probability and Statistics,* DeGroot and Schervish, Chapter 1-6 **Content:** Calculus-based probability theory, Random variables, Conditional probability, Bayes rule, Important distributions, Joint distributions, Moment generating functions, Central limit theorem, laws of large numbers, Markovs inequality.
	Probability and Statistics for Data Science STATGU5701 (Fall 2019)	**Textbook:** *Introduction to Probability and Statistics for Engineers and Scientists,* Sheldon M. Ross, Chapter 1-12, 15, *Probability and Statistics*, DeGroot and Schervish, selected reading in Chapter 7-12 **Content:** Probability theory and statistical inference used in data science; Probabilistic models, Statistical inference: Point and confidence interval estimation, Hypothesis tests, Linear regression, Maximum likelihood,

		Likelihood ratio tests, Nonparametric procedures, Theory of least squares, ANOVA, Statistical analysis trained with **R.**
	Data Visualization QMSSGR5063/ STATGU5702 (Spring 2020)	**Textbook:** *Graphical Data Analysis with R,* Scott Murray*, R Graphics Cookbook: Practical Recipes for Visualizing Data,* Winston Chang, *ggplot2: Elegant Graphics for Data Analysis,* Hadley Wickham **Content:** Mapping geographic data, text, social networks, other forms of data in dynamic and interactive displays with **R.**
	Time Series Analysis QMSSGR5016 (Fall 2020)	**Textbook:** *Introduction to Time Series Analysis*, Mark Pickup, Chapter 1-6, *R for Data Science,* Garrett Grolemund & Hadley Wickham **Content:** Time series data and longitudinal (panel) data, Regression analysis of temporal processes, Difference-in-difference models, Time series regression, Dynamic causal effects, Vector autoregressions, Cointegration, GARCH models with **R.**
	Natural Language Processing QMSSGR5067 (Fall 2020)	**Textbook:** *Speech and Language Processing,* Jurafsky and Martin, Chapter 1-11, 19, *Natural Language Processing with Python* by NLTK **Content:** NLTK, Text tokenization, Stemming, Web Scraping, Clustering, TF-IDF, Speech tagging, Sentimental analysis, Lexicons, Scikit-learn, Predictive streaming analytics.
	Data Analysis with Python QMSSGR5019 (Summer 2020)	**Textbook:** *Introductory Econometrics: A Modern Approach,* J. Wooldridge, Chapter 1-17, *Python for data analysis: Data wrangling with Pandas, NumPy, and IPython,* McKinney, Chapter 1-13 **Content:** Data structures, Multiple regression analysis, Interactions, Gauss-Markov assumptions and asymptotics, Heteroskedasticity and diagnostics, Bayes classifiers, Models for binary outcomes, Ordered data, Nominal data, First difference analysis, Factor analysis.
	Machine Learning for Social Sciences QMSSGR5073 (Summer 2020)	**Textbook:** *Introduction to Machine Learning with Python,* G. Muller, Chapter 1-6, *Applied Predictive Modeling,* Kuhn, Johnson, Chapter 1-4, 6, 12-16, 19, *Deep Learning,* Goodfellow, Bengio, Courville, Chapter 6, 7, 9 **Content:** Supervised learning, Models for classification, Imputation and feature selection, SVM, Decision trees, Random forest, Gradient boosting and calibration, Dimensionality reduction, Clustering, Manifold learning, Neural network, Image classification.
Econ	Microeconomic Analysis SIPAU6400	**Textbook:** *Microeconomics*, Besanko and Braeutigam

	(Fall 2018)	**Content:** Demand-supply model, Welfare analysis, Consumer and producer theory, Equilibrium, Welfare theorems, Externalities, Public goods, Uncertainty and asymmetric information.
	Macroeconomic Analysis SIPAU6401	**Textbook:** *Macroeconomics*, Abel, Bernanke and Croushore **Content:** Labor market, Income and wealth, Balance of payments, Asset market, Business cycle theory, The open economy. **(Waiver by Passing Proficiency Test)**
Other	Quantitative Analysis SIPAU6500 (Spring 2019)	**Textbook:** *Statistics with STATA,* Lawrence C. Hamilton, *Introduction to the Practice of Statistics,* D. Moore, G. McCabe, *Applied Regression,* M. Lewis-Beck **Content:** Introduction to probability and statistics, Hypothesis tests, Linear regression, Statistical analysis trained with **STATA**.
	Tools for Analytics IEORE4501 (Fall 2018-Audited)	**Textbook:** Handouts from Prof. Paul Logston **Content: Python** programming, Recursion, Time complexity, Algorithms and efficiency, Linux usage, SQL, Serialization, HTML, APIs.

B. Quantitative Courses at Peking University-Economics minor program

Subject	Course	Details
Economics	The Principles of Economics (Fall 2014)	**Textbook:** *The Principles of Economics*, N. Gregory Mankiw **Content:** Factors of production, Factors of demand and supply, Effective allocation of resource in a production process, Interdependence and gains from trade.
	Intermediate Econometrics (Spring 2017)	**Textbook:** *Introductory Econometrics: A Modern Approach*, Jeffery M. Wooldridge **Content:** Malfunctioning of Market, Monopoly, Externality and Asymmetric Information, Economic Behavior of Government, Public Finances.
	Intermediate Microeconomics (Spring 2015)	**Textbook:** *Intermediate Microeconomics: A Modern Approach,* Hal R. Varian **Content:** Consumer theory, Theory of the firm, Game theory, Externalities of economics theory, Problems and allocation of public goods.
	Education Economics (Spring 2015)	**Textbook:** *Economics of Education*. Amsterdam: Elsevier, Brewer, D, & Patrick McEwan. **Content：** Measurement of educational benefits, Education production function, Estimation of the relationship between education and economic growth, Expenditure on education, Allocation of funds and transfer payment.
	Intermediate Macroeconomics (Fall 2016)	**Textbook:** *Macroeconomics.* Paul Krugman **Content：** Composition and accounting of national economy, Growth and capital accumulation, Growth and policy, Inflation and unemployment, Interest and monetary policy, Exchange rate and policy, The balance of trade, Capital mobility, The Mundell-Pleming Model.
	Growth Economics (Spring 2017)	**Textbook:** *Economic Growth.* Pearson: David N Weil. **Content：** Economic perspective in public policies, Growth models.
	Economics of Innovation and Intellectual Property Rights (Spring 2017)	**Textbook:** *Innovation and Incentives*, Suzanne Scotchmer **Content:** Economics of innovation processes, Intellectual property rights, Model of the economics of optimal patent life, Model of patent licensing, The evaluation of innovations.

Finance	Internet Finance and Big Data (Spring 2015)	**Textbook:** Handouts from Prof. Fangfang Tang of Department of Economics, Peking University **Content：** Web-centric business models, Financial innovation under Internet environment.
	Low-Carbon Economy and Carbon Finance (Spring 2016)	**Textbook:** *Climate Change and Carbon Trading*, Fangfang Tang **Content:** Carbon trading theory, Climate change and carbon trading, Coase Theorem, Global public goods.
	Financial Accounting (Spring 2017)	**Textbook:** *Intermediate Financial Accounting, Yunping Wang* **Content:** Financial statement, Accounting dealing and financial report mode.
	Introduction to Internet Finance (Spring 2017)	**Textbook:** Handouts from Prof. Feng Guo of Department of Finance, Peking University **Content:** Cases about third-party payment, P2P platform, Crowd-funding, Investigation, Financial regulations