MASTER of SCIENCE PROGRAM
Mathematics in Finance

NEW YORK UNIVERSITY
Courant Institute of Mathematical Sciences

Class of 2020 Resume Book

Mathematics in Finance M.S. Program

Courant Institute of Mathematical Sciences
New York University

June 25, 2021

For the latest version, please go to
http://math.nyu.edu/financial_mathematics

Job placement contact: mthfinjobs@cims.nyu.edu

New York University
Aprivate university in the public service

Courant Institute of Mathematical Sciences
Mathematics in Finance MS Program
251 Mercer Street
New York, NY 10012-1185
Phone: (212) 998-3104; Fax: (212) 995-4195

Dear Colleague,

We are pleased to provide you with the resumes of third semester students in the Courant Institute's Mathematics in Finance Master's Program. They are starting their last semester and will graduate from our Master's program in December 2020. We hope you will consider them for possible summer internship positions at your firm.

We believe our students are the most elite, most capable, and best trained group of students of any program. This year, we admitted less than 15% of those who applied. The resumes you find in the resume book describe their distinguished backgrounds. For the past years we have a placement record close to 100% for both the summer internships and full-time positions. Our students enter into front office roles such as trading or risk management, on the buy and the sell side. Their computing and hands-on practical experience makes them productive from day one.

Our curriculum is dynamic and challenging. For example, the first semester investment class does not end with CAPM and APT, but is a serious data driven class that, for example, examines the statistical principles and practical pitfalls of covariance matrix estimation. Starting in the academic year of 2020-2021, students will learn the modern tools of machine learning as it is used in the financial industry today already in their core courses. During the second semester electives include a class on modern algorithmic trading strategies and portfolio management. Our instructors are high-level industry professionals and faculty from the Courant Institute, the top ranked department worldwide in applied mathematics. You can find more information about the curriculum and faculty at the end of this document, or at http://math.nyu.edu/financial_mathematics/.

Sincerely yours,
Petter Kolm, Director
Deane Yang, Chair
Leif Andersen, Industry Adviser

ZHENGXU (ANDREW) LI

(646) 821-5814 ■ zhengxu.li@nyu.edu ■ linkedin.com/in/zhengxu-li

EDUCATION

NEW YORK UNIVERSITY New York, NY
The Courant Institute of Mathematical Sciences
MS in Mathematics in Finance (expected – Dec. 2020) ***GPA:*** 3.85/4.0

- ***Coursework:*** derivative pricing, Black-Scholes, stochastic processes, Greeks, CAPM, mean-variance optimization, Fama-French, Monte Carlo simulation, OOP in Java, test-driven development (TDD), data-driven models, applications of big data to finance, time series analysis, econometrics

NEW YORK UNIVERSITY New York, NY
BA in Mathematics and Computer Science (Sept. 2014 – May 2018) ***GPA:*** 3.9/4.0

- ***Coursework:*** probability, statistics, calculus, data structures and algorithms (Python, Java), dynamic programming, linear algebra, scientific computing, ODEs
- ***Honors:*** Phi Beta Kappa, Magna Cum Laude

EXPERIENCE

JENNISON ASSOCIATES, LLC New York, NY
Custom Solutions Group Intern (Quantitative Research) (June 2020 – Aug. 2020)

- Conducted literature review; constructed and implemented statistical analysis in R of large-cap fundamental growth mutual funds' herding effects on stock returns
- Designed metrics to measure popularity of a stock among large-cap mutual funds; built models to select potentially top-performing stocks based on defined metrics; analysis showed models successfully picked stocks with better future returns
- Implemented stock prices and held shares adjustments based on Compustat stock split rates in R
- Summarized Lipper fund classification methodology; checked Lipper fund holding data consistency

PLUSPLUS CAPITAL MANAGEMENT Jersey City, NJ
Quantitative Research Intern (June 2018 – July 2018)

- Conducted statistical analysis in R and Excel to investigate effectiveness of metrics (Sharpe ratio, Calmar ratio, max drawdown) as predictors of funds' future performance; analysis showed the ratio (worst-month return : best-month return) best identifies potential graveyard funds
- Proposed a procedure for Fund of Funds to select hedge funds with good future performance

NEW YORK UNIVERSITY New York, NY
Summer Researcher, Advisor: Prof. Robert V. Kohn (May 2017 – Sept. 2017)

- Investigated calibration of Ross Recovery Theorem to market data and its practical value; published a 20-page paper in SIURO and assisted in presenting research at SIAM CSE conference
- Key contribution: reduced noise by reformulating optimization problems in existing mathematical model; implemented new model in MATLAB and conducted robustness test
- Examined effectiveness of the theorem by analyzing expectations, skewness, and correlations of the SPX index distributions and by back testing theorem-based trading strategy optimizing log-return
- Processed market data from Bloomberg, such as S&P 500 futures, options, and Treasury yields

CISDI ENGINEERING CO., LTD. Chongqing, China
Technology Summer Intern (June 2016 – Aug. 2016)

- Contributed to model-view-controller structure by adding data query-and-summary function in Java
- Offered advice for service enhancement by conducting statistical analysis of user data in Excel

PROJECT

Quantitative Futures Trading Strategy (Jan. 2019 – Apr. 2019)

- Implemented futures trading strategy based on Bollinger bands and MACD (36% annualized return)

COMPUTER SKILLS/OTHER

Programming Languages: R (3 years), Python (2 years), Java (4 years), MATLAB, C
Other Software: FactSet, Morningstar, Bloomberg Terminal
Interests: half marathon, art history

YIFAN (EVAN) LI

■ yl6977@nyu.edu ■ (212) 731-4579 ■ linkedin.com/in/yifan-li951128

EDUCATION

NEW YORK UNIVERSITY New York, NY
The Courant Institute of Mathematical Sciences
MS in Mathematics in Finance (Aug.2019 - Dec.2020)

- ***Coursework:*** OOP and Data Structure in Java, risk evaluation, factor model, SVD&PCA, optimization, algorithmic trading, time series, statistical arbitrage, Reinforcement Learning, machine learning, LSA, Bayesian Linear Regression, LDA&QDA, Boosting & Bagging, Kernel Regression,

SUN YAT-SEN UNIVERSITY Guangzhou, China
BMngmt in Financial Mngmt & BS in Mathematics (Sep.2014 - Jun.2019)

- ***Awards:*** Second Class Scholarship, Individual Scholarship on Social Activities

EXPERIENCE

China Asset Management Co., Ltd. Beijing, China (work from New York)
Machine Learning Engineer Intern (Jun.2020 – Jul.2020)

- Utilized Python and PyTorch to construct generative adversarial network (GAN) to improve traditional Markowitz model by simulating and estimating expected future returns and variance
- Verified model stability by comparison on results when giving multiple input similarities, verified model accuracy by comparing real data with our model estimation and historical data
- Plotted efficient frontiers separately using model estimation and historical data, then quantified the improvements on the model by implementing a backtest on our model estimation

City University of Hong Kong Hong Kong, China
Research Assistant (Jul.2018 - Sep.2018)

- Applied Python to implement a new back-testing platform, according to the characteristics of cryptocurrency data, to support research on efficient factor signals in the cryptocurrency market
- Devised a 1000+ line code of computation formulas with Python for over 100 technical factors, then calculated the factor value of each stock under new dynamic weight method
- Implemented back test on factor data calculated by different stock price adjustment methods and made comparison on the results for testing the impact of adjustment method on back-testing result

PROJECTS

FX Volatility Smile Calibration (Python) New York, NY

- Using USDBRL market data, calibrated the SABR model parameters with Hagan approximation
- Calculated call/put option strikes and volatilities for 5 market conventions: ATM, RR, and BF.

Almgren-Chriss market impact model New York, NY

- Worked with 100GB+ 3-month high frequency Nasdaq trades and quotes tick data of over 1000 tickers to calibrate Almgren market impact model by applying nonlinear regression
- Formulated the Almgren-Chriss optimal execution problem as a stochastic control problem under with alpha and without alpha conditions for furthering research on the impact of alpha
- Derived the HJB equation and solved for the control and value function, and analyzed alpha impact

Make prediction on Mkt Cap and S&P Rating with Machine Learning methods New York, NY

- Grouped the data by market cap and industry, filled in the NaNs with median values in each group
- Utilized correlation matrix, PCA and Elastic Net to eliminate the unimportant factors
- Constructed models with Machine Learning methods: SVM, MLP and Random Forest to predict Market Cap and S&P Rating, made result comparison and comments on model's performances

Enhanced stock pair-trading strategy with cointegration and risk factor correlation New York, NY

- Tested stock-pair cointegration and calibrated OU process for creating trading signals
- Enhanced strategy by risk correlation and archived 85%+ prediction accuracy in a 10-year backtest

COMPUTER SKILLS/OTHER

Programming Languages: Python, Java, C++, SQL **Certificate:** Machine Learning, Algorithms
Other Software/Tools: PyTorch, TensorFlow, Jupyter Notebook, MATLAB, Excel
Languages: Mandarin (native), English (fluent) **GitHub website:** github.com/yifanlee1128

ZHENGXU (ANDREW) LI

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EDUCATION

NEW YORK UNIVERSITY New York, NY
The Courant Institute of Mathematical Sciences
MS in Mathematics in Finance (Sept. 2019 – Jan. 2021) ***GPA:*** 3.8/4.0

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BA in Mathematics and Computer Science (Sept. 2014 – May 2018) ***GPA:*** 3.9/4.0

- ***Coursework:*** probability, statistics, calculus, linear algebra, ODEs, data structures and algorithms
- ***Honors:*** Phi Beta Kappa, Magna Cum Laude

EXPERIENCE

HUATAI SECURITIES Hong Kong, China (Remote)
Equity Derivatives Department Intern (Quantitative Research) (Jan. 2021 – Feb. 2021)

- Developed and implemented Monte Carlo and PDE Finite Difference pricing models for snowball autocallable in Python; calculated and compared price, delta, gamma, and vega from the two models
- Scripted Python tools to automatically compare trade confirmations and calculate cash flows

JENNISON ASSOCIATES, LLC (AUM: $203.7 Billion) New York, NY
Custom Solutions Group Intern (Quantitative Research) (June 2020 – Aug. 2020)

- Conducted literature review; constructed and implemented statistical analysis in R of large-cap fundamental growth mutual funds' herding effects on stock returns
- Designed metrics to measure popularity of a stock among large-cap mutual funds; built models to select potentially top-performing stocks based on defined metrics; analysis showed models successfully picked stocks with better future returns
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COMPUTER SKILLS/OTHER

Programming Languages: R (3 years), Python (2 years), Java (4 years), MATLAB, C
Other Software: FactSet, Morningstar, Bloomberg Terminal ***Interests:*** half marathon, art history

ZHILIN LIU

zhilin.liu@nyu.edu ■ www.linkedin.com/in/zhilinliu1

EDUCATION

NEW YORK UNIVERSITY New York, NY
The Courant Institute of Mathematical Sciences
MS in Mathematics in Finance (expected - Dec. 2020)

- ***Coursework:*** Advanced Portfolio Management, IRFX models, Scientific Computing in Python, factor and principal-component models, CAPM, Optimization, volatility modeling, Time Series and Statistical Arbitrage, Market Micro-structure, Structured Securities, risk management
- ***Future Coursework:*** Alternative Data, linear/quadratic regression/classification/unsupervised learning, clustering methods, EM algorithm, Gradient Descent, non-linear high-dimensional supervised learning, kernel regression methods, SVM, Random Forest, CNN, RNN

UNIVERSITY OF CALIFORNIA, IRVINE Irvine, CA
BS in Mathematics with concentration on Finance (June 2018)
BA in Quantitative Economics (June 2018) **Minor in Statistics**

- ***Coursework:*** Logistics Regression, GLMs, Econometrics, Ito's Lemma, Brownian Motion, Derivatives pricing, Probability, Linear Algebra, ODEs, PDEs

EXPERIENCE

BANK OF CHINA INTERNATIONAL CO., LIMITED Shanghai, China
Investment Banking Analyst Internship, Investment Banking Division (Nov. 2018 - Jan. 2019)

- Assisted IPO team with due diligence, by reading financial and accounting statements
- Helped with the client's capital operations plan by using WIND and company annual reports

MORGAN STANLEY CAPITAL INTERNATIONAL Beijing, China
Part-time Assistance Internship, Risk Management Division (Sep. 2017 - Oct. 2017)

- Provided support for sample data generating, variance minimization and linear transformation using Python/R, and solved problems on PDEs and SDEs
- Processed BS model, Monte Carlo simulation and 10-day 99% VaR estimation using Python/R
- Helped with research in *Statistical Arbitrage in The US Equity Market* by M. Avellaneda

PROJECTS

NEW YORK UNIVERSITY New York City, NY
Machine Learning in Empirical Asset Pricing and Risk Premia Forecasting project (Summer 2020)

- Python code frame design and implementation including data preprocessing, modeling, portfolio construction, performance and visualization (pytorch/numpy/pandas/os/pypfopt/mlfinlab/etc.)
- Evaluated top Statistical, Machine Learning and hybrid models for time series forecasting, including ESRNN, Telescope, 1D-CNN, etc. (in progress)
- GitHub URL (private): https://github.com/zliu2019/ML-Asset-Pricing-Risk-Premia-Forecasting

Foreign Exchange project (Spring 2020)

- FX Volatility smile calibration for USDBRL market data with SABR model using Python

Time Series project (Fall 2019)

- Created a strategy to trade VIX future based on the result of Ornstein-Uhlenbeck model

UNIVERSITY OF CALIFORNIA, IRVINE Irvine, CA
Volatility in Stock Market - Econometrics project with R (Winter 2018)

- Identified ARCH effect in monthly returns of the US S&P 500 by Lagrange multiplier test
- Estimated the model and made predictions to support investment plan based on measures of risk
- Compared estimated ARCH, GARCH, T-GARCH, GARCH-in-mean models using R

Anteater Bed and Breakfast - Python project (Spring 2017)

- Programmed a hotel room reservation system with strong user interface using Python

COMPUTER SKILLS/OTHER

Programming: Python, R, Java, Stata
Languages: English, Mandarin (native)

LINGLAN WANG

lw2700@nyu.edu ■ www.linkedin.com/in/linglan-wang

EDUCATION

NEW YORK UNIVERSITY New York, NY
The Courant Institute of Mathematical Sciences
MS in Mathematics in Finance (expected – December 2020)

- ***Current Coursework:*** Derivative Securities, Risk and Portfolio Management, Market Microstructure, Advanced Option Pricing, Interest Rate model, Scientific Computing in Finance
- ***Future Coursework***: Time Series Analysis & Statistical Arbitrage, Fixed Income Derivatives
- ***GPA***: Overall 3.75/4.0

UNIVERSITY OF CALIFORNIA, IRVINE Irvine, CA
BS in Mathematics & BA in Business Economics (2014 – 2018)

- ***Coursework:*** Stochastic Process, Linear Algebra, Numerical Analysis, Statistical Modelling, Object-oriented Programming, Data Structure and Algorithm
- ***Honors***: Dean's List, Phi Beta Kappa, Magna Cum Laude, Pi Mu Epsilon
- ***GPA***: Overall 3.86/4.0, Major 3.93/4.0, Top: 1%

EXPERIENCE

EVERBRIGHT SECRITIES Shanghai, China
Quantitative Analyst Intern (August 2020 – Present)

- Built Event Driven Model and Equity Multi-factor Model based on Berra and Financial Engineering Report

QUANT CHINA Shenzheng, China
Quantitative Research Summer Intern (Jun 2020 – August 2020)

- Researched on cost of carrying model improving commodity future price forecasting ability by using Brenner and Kroner Model and Standard Error Correlation Model
- Researched and implemented quantitative trading strategies, usually market-neutral statistical arbitrage strategies, on equities and financial derivatives including index futures and options

HUAHONG CAPITAL Hangzhou, China
Investment Management Intern (April 2019 – August 2019)

- Conducted stock selection, developed trading strategy, and constructed various financial models for equity valuation and return analysis
- Performed quantitative and qualitative analysis, and explored fixed-income strategies

GLOBAL AI CORPORATION New York, NY
Quantitative Strategy Intern (June 2018 – February 2019)

- Implemented constrained regression and rolling window regression models for hedge funds' performance replication with tradable ETFs on the market
- Researched 15 different hedge fund strategies, replicated its returns and trends using liquid, transparent ETFs, and explored the efficacy of different linear models for hedge fund replication

PROJECTS

UNIVERSITY OF CALIFORNIA, IRVINE Irvine, CA
Financial project

- Used Geometric Brownian motion to simulate stock price paths after exploring the fluctuation of stock market under efficient market hypothesis
- Estimated the volatility and correlation parameters between different stocks, and visualized the results using the matplotlib module Python

COMPUTER SKILLS/OTHER

Programming Languages & Others: Python, Java, MATLAB, R, SQL
Other Software: Microsoft Office (Word, Excel, PowerPoint, Outlook), Tableau, EViews
Languages: English (fluent), Mandarin (fluent)

YUYING WANG

■ 217-979-6633 ■ www.linkedin.com/in/~yuyingwang/ ■ yuying.wang@nyu.edu

EDUCATION

NEW YORK UNIVERSITY New York, NY
The Courant Institute of Mathematical Sciences
MS in Mathematics in Finance (expected - Dec. 2020)

- ***Current Coursework:*** Risk management (market, credit risk and stress testing) OOP in Java, Python numerical methods, Continuous Finance, portfolio management and option pricing
- ***Future Coursework:*** Big data applications, applications to stochastic processes, time series analysis, data science and machine learning in quantitative finance

UNIVERSITY OF ILLINOIS AT URBANA CHAMPAIGN Champaign, IL
BS in Mathematics and BS in Economics - Minor in Statistics (2015 - 2019)

- ***Coursework:*** Linear algebra, calculus and differential equations, probability, Cournot, Stackelberg, Cartel economics competition model, Python, Java/JavaScript programming

EXPERIENCE

Applied Technologies for Learning in the Arts & Science (ATLAS) Champaign, IL
Data Analysis Intern, Parenthood Expenditure Program (2018 - 2019)

- Cleaned 2 GB 11-year raw files of cigarettes, alcohol and diapers consumption of various stores using R and STATA, deleted missing observations and decided variables included in the model finding factors that might affect people's consumption behaviors after parenthood
- Assessed correlation and linear regression model along time, evaluated whether the chosen variables were significant, summarized updated model and data in weekly meetings
- Discovered and reported the flaws of the model and dataset with improvement suggestions

GF SECURITY Zhuhai, China
Summer Intern, Investment Department (2017)

- Used WIND Stock System to collect 7 IPO fund-raising companies' financial statements and annual reports, organized them to an information report to the supervisor
- Assisted colleagues in searching potential mergers for a client by looking into the relative industries and annual reports, making a list of target acquiring companies' basic information

PROJECTS

Credit Suisse New York, NY
M&A Project (2020) *Supervisor: Linda Xue; Nancy Lee*

- Created Logistics models and random forest models using Python Panda for customers' loan data, finding relationship between customers' information and default probability
- Compared and visualized the results of logistic models and random forest models using ROC curve and MSE histogram, chose the significant variables to create and run the final model
- Participated in the acquisition project of two industrial companies, doing meeting minutes and creating business profiles and pitch books for both companies

UNIVERSITY OF ILLINOIS AT URBANA CHAMPAIGN Champaign, IL
AdS/CFT Correspondence and Prisoner's Dilemma (2017 - 2019) *Professor: Gabriele La Nave*

- Applied theories of RT formulas, AdS/CFT Correspondence, SYK model and quantum entanglement, summarizing theories and providing theoretical outlines for a new method of solving Prisoner's Dilemma using quantum theories and physical models
- Presented study and thoughts in front of the professor and PhD students, illustrating the overall ideas of the research, detailed formulas and theories that will be used to create model
- Writing the paper using LaTeX, expect to finish by the end of 2020

COMPUTER SKILLS

Programming: Python, Java, Java Script, R/ R studio, LaTeX, SQLite
Softwares: Microsoft Office, iMovie, STATA, Eviews

YUNXIAO XIANG

(858) 539-6087 ■ xiang.yunxiao@nyu.edu ■ linkedin.com/in/yunxiaoxiang

EDUCATION

New York University, The Courant Institute of Mathematical Sciences New York, NY
M.S. in Mathematics in Finance; Current GPA: 3.8/4.0 Dec. 2020

- ***Coursework:*** martingales, PCA, Monte Carlo, local volatility, SVI, Brownian motion, Black-Scholes, Black-Litterman, multiprocessing, VaR, GA, Greeks, Itô lemma, GARCH, LRU cache, cross-validation

University of California, San Diego La Jolla, CA
B.S. in Applied Mathematics; B.A. in Economics; GPA: 3.8/4.0 Jun. 2019

- ***Coursework:*** Markowitz model, CAPM, arbitrage pricing theory, factor model, hypothesis test, ODE, bootstrap, MLE, CLT, SVD, PCA, regression, ACF, SARIMA model, backtesting, heat equation

EXPERIENCE

Axiomquant Investment Management, LLC HQ: Beijing, CN
Quantitative Research Intern (Remote in New York) Jul. 2020 – present

- Processed 5 years' auction, close, market data to extract 132 intraday, cross-date, cross-stock features
- Leveraged LRU Cache to optimize repetitive cross-date function call, multiprocessing to paralyze process
- Built regression model to predict future returns; selected significant features by evaluating out-of-sample liquidity-weighted correlation, rolling cross-validation, Sharpe and PnL of prediction-based portfolio
- Backtested daily rebalanced portfolio on 2020 test set; achieved correlation of 0.087 and Sharpe of 8.57

RavenPack New York, NY
Summer Research Project Leader (Mentors: Ricard Matas, Peter Hafez) Jul. 2020 – present

- Filtered for novel events based on sentiment score; visualized distance between events and analyst ratings
- Leveraged Bayesian approach to compute P (analyst rating change | event X happened in Y days) for each (X, Y, entity); checked event volume, probability distributions and significant ratios for subset selection
- Implemented XGBoost to forecast analyst rating events; tackled imbalanced labels by oversampling
- Translated conditional probabilities into long-short portfolio; evaluated out-of-sample Sharpe and PnL

Ubiquant Investment Co., Ltd. HQ: Beijing, CN
Data Analyst Intern (Remote in New York) Apr. 2020 – Jul. 2020

- Implemented Almgren's impact model to estimate implicit cost of trades size up to 10% of market volume
- Processed TAQ data to efficiently generate model inputs – volume time, execution details, volatility, etc.
- Leveraged non-linear Gauss-Newton optimization and regression to fit impact coefficients and exponents
- Incorporated trading impact in backtesting strategy to compute more realistic Sharpe (from 4.38 to 3.53)

Black Wing Asset Co., Ltd. Shanghai, CN
Summer Investment Analyst Intern Aug. 2018 – Sep. 2018

- Discovered 6.3% loss in small-cap market simulation; customized strategy by incorporating implicit cost
- Implemented momentum strategy with MA, MACD indicators, improved clients' portfolio returns by 5%

PROJECTS

S&P500 Dispersion Trading – NYU Capstone Project in Python (Mentor: Sebastien Bossu)

- Estimated implied dividend of S&P500 component stocks by put-call inequality of American options
- Calibrated SVI volatility surfaces for 15 years to price variance swaps; constructed zero-cost dispersion portfolio; computed implied correlation from portfolio and compared with realized correlation

Deal Probability of Russian Commodities – NLP in Python and Multivariate Regression in R

- Leveraged NLP to extract numerical variables from descriptions and images; visualized sample attributes
- Built logistic regression after subset selection to model skewed deal probability with over 50% zeroes
- Conducted hypothesis test to find variable significantly influence probability; presented findings in report

Path-dependent Options Pricing – Monte Carlo, Numerical PDE, and Analytical PDE in Python

- Leveraged Implicit Euler Scheme, Monte Carlo, analytical PDE solution to price down-and-out Call

COMPUTER SKILLS/OTHER

Programming Languages: Python, Java (5 years); R, Advanced Excel, MATLAB (2 years); SQL (1 year)
Languages: Mandarin (native), English (fluent), Japanese (basic)

MINGYUE ZHANG

(347) 563−8683 ■ mingyue.zhang@nyu.edu ■ linkedin.com/in/mingyue-zhang-710159174

EDUCATION

NEW YORK UNIVERSITY New York, NY

The Courant Institute of Mathematical Sciences

MS in Mathematics in Finance (expected – December 2020)

- ***Coursework:*** Asset pricing, Interest rate & FX models, SVM, Random forests, Logistic regression, Ito calculus, Scientific computing in Python (Monte Carlo, Interpolation, PCA)

WUHAN UNIVERSITY Hubei, China

BA in Finance and BS in Mathematics, Major in Mathematical Finance (2015 – 2019)

- ***Coursework:*** Greek letters, Ridge regression, K-Nearest Neighbors, Mathematical Analysis

EXPERIENCE

SECURITY BENEFIT New York, NY

Quantitative Analyst Intern (Derivatives Trading and Analytics) (Jun. 2020 – Jul. 2020)

- Researched and replicated indices strategies which used quantitative techniques involving vol control, clustering, information ratio, etc. (outcome error less than 1 bp)
- Analyzed and replicated popular indices on market which use hybrid instruments as components and compared indices' performance to design new index methodology
- Achieved to use optimizer to deduce unknown parameters from data
- Programed vanilla option pricer application in Matlab

SHENWAN HONGYUAN SECURITIES Beijing, China

Quantitative Analyst Intern (Jan. 2019 – Apr. 2019)

- Analyzed at-the-money commodity options' Theta and implied volatility data to make profit from time value through VBA program which can download and manipulate data automatically over changeable periods and commodities' combinations
- Built commodity indices as predictor of future prices using Dow Jones Commodity Index's methodology and programed to download, save over 100 GB tick-level data in HDF5 format and tested strategy's performance (13% total return rate, 9% max drawdown)
- Programed to automatically match, classify, write and save debts' information (about 2000 lines) into certain types and formats from txt file to excel using Python
- Maintained and ameliorated private quantitative factors library by Python

Quantitative Analyst Intern (Jul. 2018 – Dec. 2018)

- Researched and implemented Choppy Market Index and R-Breaker to construct CTA strategy, back-tested its performance in Python and ameliorated model (12% total return rate)
- Dug up over 300 companies' research reports to identify their potential needs for options
- Participated in constructing local database for minute-level data of commodity futures through Python which can automatically download and refresh data from cloud to local database

PROJECTS

Monte Carlo Simulation in Java

- Priced European and Asian options, evaluated the stopping criteria based on payout's standard deviations and Applied importance sampling to significantly reduce the variance

Stock Selection Using Machine Learning in Python

- Implemented random forest regression-based algorithm and Python framework to identify stocks that will beat market (outperformed CSI 300 index on the 5-year period in the back-testing)

COMPUTER SKILLS/OTHER

Programming Languages: Python, C/C++, Java, SQL, VBA, MATLAB, R

The Mathematics in Finance Masters Program
Courant Institute, New York University
Academic Year 2020-2021

The curriculum has four main components:

1. **Financial Theory, Statistics and Financial Data Science**. These courses form the core of the program, covering topics ranging from equilibrium theory, Black-Scholes, Heath-Jarrow- Morton, linear regressions, covariance matrix estimation to modern machine learning techniques and how they are used in quantitative finance.
2. **Practical Financial Applications**. These classes are taught by industry specialists from prominent Wall Street firms. They emphasize the practical aspects of quantitative finance, drawing on the instructor's subject matter experience and expertise.
3. **Mathematical Tools**. This component provides appropriate mathematical background in areas like stochastic calculus and partial differential equations.
4. **Computational Skills**. These classes provide students with a broad range of software skills in Java and Python, and facility with computational methods such as optimization, Monte Carlo simulation, EM-type algorithms and the numerical solution of partial differential equations.

		First Semester	Second Semester	Third Semester
Practical Financial Applications			Advanced Topics in Equity Derivatives (1/2 Semester) ___ Algorithmic Trading & Quant. Strategies Advanced Risk Management ___ Interest Rate and FX Models ___ Market Microstructure (1/2 Semester) ___ Modeling and Risk Management of Bonds and Securitized Products (1/2 Semester) ___ Trading Energy Derivatives (1/2 Semester)	Alternative Data in Quantitative Finance (1/2 Semester) ___ Credit Analytics: Bonds, Loans & Derivatives (1/2 Semester) ___ Fixed Income Derivatives: Models & Strategies in Practice (1/2 Semester) ___ Project and Presentation ___ Trends in Sell-Side Modeling: XVA, Capital and Credit Derivatives

		First Semester	Second Semester	Third Semester
Financial Theory, Statistics and Financial Data Science		Financial Securities and Markets — Risk and Portfolio Management	Active Portfolio Management — Dynamic Asset Pricing (1/2 Semester) — Machine Learning & Computational Statistics (1/2 Semester)	Advanced Statistical Inference and Machine Learning — Data Science in Quantitative Finance — Time Series Analysis & Stat. Arbitrage
Mathematical Tools		Stochastic Calculus		Nonlinear Problems in Finance: Models and Computational Methods
Computational Skills		Computing in Finance — Data Science and Data-Driven Modeling (1/2 Semester)	Scientific Computing in Finance	

Practical Training. In addition to coursework, the program emphasizes practical experience. All students do a capstone project (the Project and Presentation course), mentored by finance professionals. Most full-time students do internships during the summer between their second and third semesters.

See the program web page http://math.nyu.edu/financial_mathematics for additional information.

MATHEMATICS IN FINANCE MS COURSES, 2020-2021

PRACTICAL FINANCIAL APPLICATIONS:

MATH-GA 2752-001 ACTIVE PORTFOLIO MANAGEMENT

Spring term: J. Benveniste

Prerequisites: Computing in Finance, Risk & Portfolio Management.

The first part of the course will cover the theoretical aspects of portfolio construction and optimization. The focus will be on advanced techniques in portfolio construction, addressing the extensions to traditional mean-variance optimization including robust optimization, dynamical programming and Bayesian choice. The second part of the course will focus on the econometric issues associated with portfolio optimization. Issues such as estimation of returns, covariance structure, predictability, and the

necessary econometric techniques to succeed in portfolio management will be covered. Readings will be drawn from the literature and extensive class notes.

MATH-GA 2753-001 ADVANCED RISK MANAGEMENT
Spring term: K. Abbott
Prerequisites: Financial Securities and Markets, and Computing in Finance or equivalent programming experience.

This course gives a broad overview of the field, from the perspective of both a risk management department and of a trading desk manager, with an emphasis on the role of financial mathematics and modeling in quantifying risk. The course will discuss how key players such as regulators, risk managers, and senior managers interact with trading. Specific techniques for measuring and managing the risk of trading and investment positions will be discussed for positions in equities, credit, interest rates, foreign exchange, commodities, vanilla options, and exotic options. Students will be trained in developing risk sensitivity reports and using them to explain income, design static and dynamic hedges, and measure value-at-risk and stress tests. Students will create Monte Carlo simulations to determine hedge effectiveness. Extensive use will be made of examples drawn from real trading experience, with a particular emphasis on lessons to be learned from trading disasters.

MATH-GA.2801-001 ADVANCED TOPICS IN EQUITY DERIVATIVES
Spring term: S. Bossu
Prerequisites: Financial Securities and Markets, Stochastic Calculus, and Computing in Finance or equivalent programming experience.

This half-semester course will give a practitioner's perspective on a variety of advanced topics with a particular focus on equity derivatives instruments, including volatility and correlation modeling and trading, and exotic options and structured products. Some meta-mathematical topics such as the practical and regulatory aspects of setting up a hedge fund will also be covered.

MATH-GA.2804-001 CREDIT ANALYTICS: BONDS, LOANS AND DERIVATIVES
Fall term: B. Fleasker
Prerequisites: Derivative Securities and Computing in Finance (or equivalent familiarity with financial models and computing skills).

This half-semester course introduces the institutional market for bonds and loans subject to default risk and develops concepts and quantitative frameworks useful for modeling the valuation and risk management of such fixed income instruments and their associated derivatives. Emphasis will be put on theoretical arbitrage restrictions on the relative value between related instruments and practical applications in hedging, especially with credit derivatives. Some attention will be paid to market convention and related terminology, both to ensure proper interpretation of market data and to prepare students for careers in the field.

We will draw on the fundamental theory of derivatives valuation in complete markets and the probabilistic representation of the associated valuation operator. As required, this will be extended to incomplete markets in the context of doubly stochastic jump-diffusion processes. Specific models will be introduced, both as examples of the underlying theory and as tools that can be (and are) used to make trading and portfolio management decisions in real world markets.

MATH-GA.2803-001 FIXED INCOME DERIVATIVES: MODELS & STRATEGIES IN PRACTICE

Fall term: L. Tatevossian and A. Sadr

Prerequisites: Computing in Finance (or equivalent programming skills) and Financial Securities and Markets (familiarity with Black-Scholes interest rate models).

This half-semester class focuses on the practical workings of the fixed-income and rates-derivatives markets. The course content is motivated by a representative set of real-world trading, investment, and hedging objectives. Each situation will be examined from the ground level and its risk and reward attributes will be identified. This will enable the students to understand the link from the underlying market views to the applicable product set and the tools for managing the position once it is implemented. Common threads among products – structural or model-based – will be emphasized. We plan on covering bonds, swaps, flow options, semi-exotics, and some structured products.

A problem-oriented holistic view of the rate-derivatives market is a natural way to understand the line from product creation to modeling, marketing, trading, and hedging. The instructors hope to convey their intuition about both the power and limitations of models and show how sell-side practitioners manage these constraints in the context of changes in market backdrop, customer demands, and trading parameters.

MATH-GA 2798-001 INTEREST RATE AND FX MODELS

Spring term: F. Mercurio & T. Fisher

Prerequisites: Financial Securities and Markets, Stochastic Calculus, and Computing in Finance or equivalent familiarity with financial models, stochastic methods, and computing skills.

The course is divided into two parts. The first addresses the fixed-income models most frequently used in the finance industry, and their applications to the pricing and hedging of interest-based derivatives. The second part covers the foreign exchange derivatives markets, with a focus on vanilla options and first-generation (flow) exotics. Throughout both parts, the emphasis is on practical aspects of modeling, and the significance of the models for the valuation and risk management of widely-used derivative instruments.

MATH-GA.2802-001 MARKET MICROSTRUCTURE

Spring term: G. Ritter

Prerequisites: Financial Securities and Markets, Risk and Portfolio Management, and Computing in Finance or equivalent programming experience.

This is a half-semester course covering topics of interest to both buy-side traders and sell-side execution quants. The course will provide a detailed look at how the trading process actually occurs and how to optimally interact with a continuous limit-order book market.

We begin with a review of early models, which assume competitive suppliers of liquidity whose revenues, corresponding to the spread, reflect the costs they incur. We discuss the structure of modern electronic limit order book markets and exchanges, including queue priority mechanisms, order types and hidden liquidity. We examine technological solutions that facilitate trading such as matching engines, ECNs, dark pools, multiple venue problems and smart order routers.

The second part of the course is dedicated pre-trade market impact estimation, post-trade slippage analysis, optimal execution strategies and dynamic no-arbitrage models. We cover Almgren-Chriss model for optimal execution, Gatheral's no-dynamic-arbitrage principle and the fundamental relationship between the average response of the market price to traded quantity, and properties of the

decay of market impact.

Homework assignments will supplement the topics discussed in lecture. Some coding in Java will be required and students will learn to write their own simple limit-order-book simulator and analyze real NYSE TAQ data.

MATH-GA.2799-001 MODELING AND RISK MANAGEMENT OF BONDS AND SECURITIZED PRODUCTS

Spring term: R. Sunada-Wong

Prerequisites: Stochastic Calculus, and Financial Securities and Markets or equivalent knowledge of basic bond mathematics and bond risk measures (duration and convexity).

This half-semester course will cover the fundamentals of Securitized Products, emphasizing Residential Mortgages and Mortgage-Backed Securities (MBS). We will build pricing models that generate cash flows taking into account interest rates and prepayments. The course will also review subprime mortgages, CDO's, Commercial Mortgage Backed Securities (CMBS), Auto Asset Backed Securities (ABS), Credit Card ABS, CLO's, Peer-to-peer / MarketPlace Lending, and will discuss drivers of the financial crisis and model risk.

MATH-GA.2800-001 TRADING ENERGY DERIVATIVES

Spring term: I.Bouchouev

Prerequisites: Financial Securities and Markets, and Stochastic Calculus.

The course provides a comprehensive overview of most commonly traded quantitative strategies in energy markets. The class bridges quantitative finance and energy economics covering theories of storage, net hedging pressure, optimal risk transfer, and derivatives pricing models. Throughout the course, the emphasis is placed on understanding the behavior of various market participants and trading strategies designed to monetize inefficiencies resulting from their activities and hedging needs. We discuss in detail recent structural changes related to financialization of energy commodities, cross-market spillovers, and linkages to other financial asset classes.

Trading strategies include traditional risk premia, volatility, correlation, and higher-order options Greeks. Examples and case studies are based on actual market episodes using real market data.

MATH-GA.2805-001 TRENDS IN SELL-SIDE MODELING: XVA, CAPITAL AND CREDIT DERIVATIVES

Fall term: L. Andersen

Prerequisites: Advanced Risk Management, Financial Securities and Markets or equivalent familiarity with market and credit risk models, and Computing in Finance or equivalent programming experience.

This class explores technical and regulatory aspects of counterparty credit risk, with an emphasis on model building and computational methods. The first part of the class will provide technical foundation, including the mathematical tools needed to define and compute valuation adjustments such as CVA and DVA. The second part of the class will move from pricing to regulation, with an emphasis on the computational aspects of regulatory credit risk capital under Basel 3. A variety of highly topical subjects will be discussed during the course, including: funding costs, XVA metrics, initial margin, credit risk mitigation, central clearing, and balance sheet management. Students will get to build a realistic computer system for counterparty risk management of collateralized fixed income portfolios, and will be exposed to modern frameworks for interest rate simulation and capital management.

FINANCIAL THEORY, STATISTICS AND FINANCIAL DATA SCIENCE:

MATH-GA 2708-001 ALGORITHMIC TRADING & QUANTITATIVE STRATEGIES

Spring term: P. Kolm and L. Maclin

Prerequisites: Computing in Finance, and Risk and Portfolio Management, or equivalent.

In the first part of the course, we study the mechanics of trading in the financial markets, some typical trading strategies, and how to work with and model high frequency data. Then we turn to transaction costs and market impact models, portfolio construction and robust optimization, and optimal betting and execution strategies. In the last part of the course, we focus on simulation techniques, back-testing strategies, and performance measurement. We use advanced econometric tools and model risk mitigation techniques throughout the course. Handouts and/or references will be provided on each topic.

MATH-GA 2793-001 DYNAMIC ASSET PRICING

Spring term: B.Dupire & M. Essid

Prerequisites: Calculus-based probability, Stochastic Calculus, and a one semester course on derivative pricing (such as what is covered in Financial Securities and Markets).

This is an advanced course on asset pricing and trading of derivative securities. Using tools and techniques from stochastic calculus, we cover (1) Black-Scholes-Merton option pricing; (2) the martingale approach to arbitrage pricing; (3) incomplete markets; and (4) the general option pricing formula using the change of numeraire technique. As an important example of incomplete markets, we discuss bond markets, interest rates and basic term-structure models such as Vasicek and Hull-White. It is important that students taking this course have good working knowledge of calculus-based probability and stochastic calculus. Students should also have taken the course "Derivative Securities" previously. In addition, we recommend an intermediate course on mathematical statistics or engineering statistics as an optional prerequisite for this class.

MATH-GA 2791-001 FINANCIAL SECURITIES AND MARKETS

Fall term: M. Avellanda

Prerequisites: Multivariate calculus, linear algebra, and calculus-based probability.

This course provides a quantitative introduction to financial securities for students who are aspiring to careers in the financial industry. We study how securities traded, priced and hedged in the financial markets. Topics include: arbitrage; risk-neutral valuation; the log-normal hypothesis; binomial trees; the Black- Scholes formula and applications; the Black-Scholes partial differential equation; American options; one-factor interest rate models; swaps, caps, floors, swaptions, and other interest-based derivatives; credit risk and credit derivatives; clearing; valuation adjustment and capital requirements.

It is important that students taking this course have good working knowledge of multivariate calculus, linear algebra and calculus-based probability.

MATH-GA 2071-001 MACHINE LEARNING & COMPUTATIONAL STATISTICS

Spring term: I. Dimov

Prerequisites: Multivariate calculus, linear algebra, and calculus-based probability. Students should also have working knowledge of basic statistics and machine learning (such as what is covered in Data Science and Data-Driven Modeling).

This half-semester course (a natural sequel to the course "Data Science & Data-Driven Modeling") examines techniques in machine learning and computational statistics in a unified way as they are used in the financial industry. We cover supervised learning (regression and classification using linear and nonlinear models), specifically examining splines and kernel smoothers, bagging and boosting approaches; and how to evaluate and compare the performance of these machine learning models. Cross-validation and bootstrapping are important techniques from the standard machine learning toolkit, but these need to be modified when used on many financial and alternative datasets. In addition, we discuss random forests and provide an introduction to neural networks. Hands-on homework form an integral part of the course, where we analyze real-world datasets and model them in Python using the machine learning techniques discussed in the lectures. It is important that students taking this course have good working knowledge of multivariate calculus, linear algebra and calculus-based probability. Students should also know basic statistics and machine learning (such as what is covered in the "Data Science & Modeling" course at NYU Courant) and be familiar with the standard "Python stack".

MATH-GA 2755-001 PROJECT AND PRESENTATION

Fall term and spring term: P. Kolm

Students in the Mathematics in Finance program conduct research projects individually or in small groups under the supervision of finance professionals. The course culminates in oral and written presentations of the research results.

MATH-GA 2751-001 RISK AND PORTFOLIO MANAGEMENT

Fall term: K. Winston

Prerequisites: Multivariate calculus, linear algebra, and calculus-based probability

A comprehensive introduction to the theory and practice of portfolio management, the central component of which is risk management. Econometric techniques are surveyed and applied to these disciplines. Topics covered include: factor and principal-component models, CAPM, dynamic asset pricing models, Black-Litterman, forecasting techniques and pitfalls, volatility modeling, regime-switching models, and many facets of risk management, both theory and practice.

MATH-GA 2707-001 TIME SERIES ANALYSIS AND STATISTICAL ARBITRAGE

Fall term: F. Asl and R. Reider

Prerequisites: Financial Securities and Markets, Scientific Computing, and familiarity with basic probability.

The term "statistical arbitrage" covers any trading strategy that uses statistical tools and time series analysis to identify approximate arbitrage opportunities while evaluating the risks inherent in the trades (considering the transaction costs and other practical aspects). This course starts with a review of Time Series models and addresses econometric aspects of financial markets such as volatility and correlation models. We will review several stochastic volatility models and their estimation and calibration techniques as well as their applications in volatility based trading strategies. We will then focus on statistical arbitrage trading strategies based on cointegration, and review pairs trading strategies. We will present several key concepts of market microstructure, including models of market impact, which will be discussed in the context of developing strategies for optimal execution. We will also present practical constraints in trading strategies and further practical issues in simulation techniques. Finally, we will review several algorithmic trading strategies frequently used by practitioners.

MATHEMATICAL TOOLS:

MATH-GA 2903-001 STOCHASTIC CALCULUS

Fall term: J.Goodman

Prerequisite: Multivariate calculus, linear algebra, and calculus-based probability.

The goal of this half-semester course is for students to develop an understanding of the techniques of stochastic processes and stochastic calculus as it is applied in financial applications. We begin by constructing the Brownian motion (BM) and the Ito integral, studying their properties. Then we turn to Ito's lemma and Girsanov's theorem, covering several practical applications. Towards the end of the course, we study the linkage between SDEs and PDEs through the Feynman-Kac equation. It is important that students taking this course have good working knowledge of calculus-based probability.

COMPUTATIONAL SKILLS:

MATH-GA 2049-001 ALTERNATIVE DATA IN QUANTITATIVE FINANCE

Fall term: G. Ekster

Prerequisites: Risk and Portfolio Management, Computing in Finance. In addition, students should have a working knowledge of statistics, finance, and basic machine learning. Students should have working experience with the Python stack (numpy/pandas/scikit-learn).

This half-semester elective course examines techniques dealing with the challenges of the alternative data ecosystem in quantitative and fundamental investment processes. We will address the quantitative tools and technique for alternative data including identifier mapping, stable panel creation, dataset evaluation and sensitive information extraction. We will go through the quantitative process of transferring raw data into investment data and tradable signals using text mining, time series analysis and machine learning. It is important that students taking this course have working experience with Python Stack. We will analyze real-world datasets and model them in Python using techniques from statistics, quantitative finance and machine learning.

MATH-GA 2046-001 ADVANCED STATISTICAL INFERENCE AND MACHINE LEARNING

Fall term: G. Ritter

Prerequisites: Financial Securities and Markets, Risk & Portfolio Management, and Computing in Finance or equivalent programming experience.

A rigorous background in Bayesian statistics geared towards applications in finance, including decision theory and the Bayesian approach to modeling, inference, point estimation, and forecasting, sufficient statistics, exponential families and conjugate priors, and the posterior predictive density. A detailed treatment of multivariate regression including Bayesian regression, variable selection techniques, multilevel/hierarchical regression models, and generalized linear models (GLMs). Inference for classical time-series models, state estimation and parameter learning in Hidden Markov Models (HMMs) including the Kalman filter, the Baum-Welch algorithm and more generally, Bayesian networks and belief propagation. Solution techniques including Markov Chain Monte Carlo methods, Gibbs Sampling, the EM algorithm, and variational mean field. Real world examples drawn from finance to include stochastic volatility models, portfolio optimization with transaction costs, risk models, and multivariate forecasting.

MATH-GA 2041-001 COMPUTING IN FINANCE

Fall term: E. Fishler and L. Maclin

Prerequisites: Procedural programming, some knowledge of Java recommended.

This course will introduce students to the software development process, including applications in financial asset trading, research, hedging, portfolio management, and risk management. Students will use the Java programming language to develop object-oriented software, and will focus on the most broadly important elements of programming - superior design, effective problem solving, and the proper use of data structures and algorithms. Students will work with market and historical data to run simulations and test strategies. The course is designed to give students a feel for the practical considerations of software development and deployment. Several key technologies and recent innovations in financial computing will be presented and discussed.

MATH-GA 2070-001 DATA SCIENCE AND DATA-DRIVEN MODELING

Fall term: P. Kolm and I. Dimov

Prerequisites: Multivariate calculus, linear algebra, and calculus-based probability.

This is a half-semester course covering practical aspects of econometrics/statistics and data science/machine learning in an integrated and unified way as they are applied in the financial industry. We examine statistical inference for linear models, supervised learning (Lasso, ridge and elastic-net), and unsupervised learning (PCA- and SVD-based) machine learning techniques, applying these to solve common problems in finance. In addition, we cover model selection via cross-validation; manipulating, merging and cleaning large datasets in Python; and web-scraping of publicly available data.

MATH-GA 2047-001 DATA SCIENCE IN QUANTITATIVE FINANCE
Fall term: P. Kolm and I. Dimov
Prerequisites: Risk & Portfolio Management, Scientific Computing in Finance (or Scientific Computing) and Computing in Finance or equivalent programming experience.

This is a full semester course focusing on practical aspects of alternative data, machine learning and data science in quantitative finance. Homework and hands-on projects form an integral part of the course, where students get to explore real-world datasets and software.

The course begins with an overview of the field, its technological and mathematical foundations, paying special attention to differences between data science in finance and other industries. We review the software that will be used throughout the course.

We examine the basic problems of supervised and unsupervised machine learning, and learn the link between regression and conditioning. Then we deepen our understanding of the main challenge in data science – the curse of dimensionality – as well as the basic trade-off of variance (model parsimony) vs. bias (model flexibility).

Demonstrations are given for real world data sets and basic data acquisition techniques such as web scraping and the merging of data sets. As homework each student is assigned to take part in downloading, cleaning, and testing data in a common repository, to be used at later stages in the class.

MATH-GA 2045-001 NONLINEAR PROBLEMS IN FINANCE: MODELS AND COMPUTATIONAL METHODS
Fall term: J. Guyon & B. Liang
Prerequisites: Scientific Computing or Numerical Methods II, Continuous Time Finance, or permission of instructor.

Computational techniques for solving mathematical problems arising in finance. Dynamic programming for decision problems involving Markov chains and stochastic games. Numerical solution of parabolic partial differential equations for option valuation and their relation to tree methods. Stochastic simulation, Monte Carlo, and path generation for stochastic differential equations, including variance reduction techniques, low discrepancy sequences, and sensitivity analysis. We examine linear and quadratic methods in regression, classification and unsupervised learning. We build a BARRA-style implicit risk-factor model and examine predictive models for county-level real estate, economic and demographic data, and macro economic data. We then take a dive into PCA, ICA and clustering methods to develop global macro indicators and estimate stable correlation matrices for equities. In many real-life problems, one needs to do SVD on a matrix with missing values. Common applications include noisy image-recognition and recommendation systems. We discuss the Expectation Maximization algorithm, the L1-regularized Compressed Sensing algorithm, and a naïve gradient search algorithm. The rest of the course focuses on non-linear or high-dimensional supervised learning problems. First, kernel smoothing and kernel regression methods are introduced as a way to tackle nonlinear problems in low dimensions in a nearly model-free way. Then we proceed to generalize the kernel regression method in the Bayesian Regression framework of Gaussian Fields, and for

classification as we introduce Support Vector Machines, Random Forest regression, Neural Nets and Universal Function Approximators.

MATH-GA 2048-001 SCIENTIFIC COMPUTING IN FINANCE
Spring term: Y. Li
Prerequisites: Risk and Portfolio Management, Financial Securities and Markets, and Computing in Finance.

A practical introduction to scientific computing covering theory and basic algorithms together with use of visualization tools and principles behind reliable, efficient, and accurate software. Students will program in C/C++ and use Matlab for visualizing and quick prototyping. Specific topics include IEEE arithmetic, conditioning and error analysis, classical numerical analysis (finite difference and integration formulas, etc.), numerical linear algebra, optimization and nonlinear equations, ordinary differential equations, and (very) basic Monte Carlo.