XINYU LI

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EDUCATION

University of California at Berkeley 09/2020-Expected 2025, Berkeley
Industrial Engineering and Operations Research (Ph.D.)

New York University Shanghai 09/2016-05/2020, Shanghai
Honors Mathematics *with honors* (B.S.), Minor in Data Science *magna cum laude*

New York University 09/2018-08/2019, New York

Highlighted Coursework: *Functional Analysis(graduate), Optimization (graduate), Applied Stochastic Analysis (PhD level), Monte Carlo Method (PhD level), Probability Limit Theorem (graduate), Scientific Computing (graduate), Machine Learning, Mathematical Statistics for Data Science*

RESEARCH EXPERIENCE

First-Order Methods for Peng-Wei Semi-definite Programming 02/2020-05/2020

Advisor: Prof. Shuyang Ling, NYU Shanghai

- Solved Peng-Wei Semi-Definite Programming (SDP) Relaxation using James Renegar's efficient first-order methods for SDP
- Designed three efficient algorithms and reduced the bound of total computational complexity compared with previous literature
- Built the test case models and implemented the algorithms on unsupervised machine learning clustering problems
- Drafted a senior thesis *Efficient First-Order Methods for Peng-Wei Semi-definite Programming with application to optimal clustering*

Stochastic-Optimization-Based Stochastic Optimal Control 05/2019-09/2019

Advisor: Prof. Jonathan Goodman, Courant Institute of Mathematical Sciences (CIMS)

- Built a test model based on Ornstein-Uhlenbeck process, applied and Linear Quadratic Gaussian (LQG) regulator on a linear model and compared results to those yielded by Stochastic Gradient Descent algorithm
- Studied Princeton's graduate course *Optimal Control and Estimation*; Derived equations of the LQG control in steady state of the system; solved for the theoretical solution of the LQG problem by applying deterministic optimization methods; Applied Dynamic Programming approach to conducting LQG to verify the results
- Built a nonlinear ODE model with noise as a combination of Minimal Glucose Model and Pharmacokinetics Insulin dynamics with insulin injection and meal disturbance for Type 1 diabetes patients (T1D)
- Conducted a literature review on effective glucose control on T1D and parameter estimation strategies
- Implemented filter and stochastic optimization methods, and proposed improvements on control strategy
- Summarized the programs and drafted a report in collaboration with another student at CIMS
- Presented at NYU Courant Summer Undergraduate Research Experience symposium

Effects of Nutrient Depletion on Tissue Growth in a Tissue-Engineering Scaffold Pore 05/2019-09/2019

Advisor: Prof. Pejman Sanaei, Courant Institute of Mathematical Sciences (CIMS)

- Solved Stoke's equation subject to no-slip and no penetration boundary conditions and advection-diffusion equation in cylindrical coordinates for nutrient concentration PDE using asymptotical analysis
- Built a model for cell proliferation in a tissue engineering scaffold pore and simulated the process with quasi-static analysis; Created a reverse process model to find out the optimal geometry of the scaffold given a specific restriction on tissue shape
- Drafted a paper *Cell proliferation in a tissue engineering scaffold pore, and the effects of nutrient concentration and scaffold internal geometry* in collaboration with another student at CIMS
- Presented at International Congress on Industrial and Applied Mathematics 2019
- Presented at 72nd Annual meeting of American Physics Society

FFT-based Modeling of the Coupling Behaviors of Composite Materials 11/2017-05/2018

Advisor: Prof. Romain Corcolle, NYU Shanghai

- Developed a model based on the Fast Fourier Transform (FFT) describing the homogeneous response of composite materials such as piezoelectric and magneto-strictive materials
- Constructed an effective property matrix considering coupled behaviors, and calculated the corresponding Green's operator in Fourier space, wrote an FFT-based coupling algorithm and ran simulations
- Compared the results with uncoupled algorithm and Finite Element Method
- Presented at NYU Shanghai DURF symposium

COMPETITION AND AWARDS

- NYU Shanghai Excellence Award 2020
- Major Honors in Major Honors Mathematics 2020
- Zhang Xiaoqi & Cheung Kwok Ching Global Future Scholar 2018-2020

- NYU Shanghai Recognition Award with scholarship 2018-2020
- NYU Courant Summer Undergraduate Research Fund 05/2019
- Meritorious Winner of Mathematical Contest in Modelling (top 9%) 03/2019
- NYU Shanghai Deans' Undergraduate Research Fund 05/2018
- Dean's List of Honors 2016-2019
- Champion of Shanghai Schools Football League with NYU Shanghai women's soccer team 2018

TEACHING EXPERIENCE

Multivariable Calculus (Learning assistant); Intro to Computer Programming (Learning assistant); Po-Shen Loh's Olympiad math class (Class teacher)

SKILLS

English: TOFEL: 109 (Reading 27+Listening 27+Speaking 25+Writing 27),
GRE: 331 (Verbal 163 (93%) + Quantitative 168 (93%) AW 3.5);
Programming Language: Python, MATLAB, Java