Grace Li

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Education

University of California, Los Angeles (UCLA) Sep 2019 - Present
PhD in Mathematics (Applied), Expected Completion: 2024
GPA: 4.0/4.0

The Cooper Union for the Advancement of Science and Art, New York, NY Graduated: May 2017
B.E. in Chemical Engineering with Mathematics Minor
Summa Cum Laude, GPA: 3.89/4.00

Illinois Mathematics and Science Academy, Aurora, IL Graduated: June 2013
High school diploma

Work Experience

High Energy Density Physics Intern
Lawrence Livermore National Laboratory, Livermore, CA *Summer 2021*
- Investigating the effect of geometry and scaling of material grain structures on shock propagation and behavior
- Utilizing asymptotic analysis, Fourier analysis, and numerical simulation of the governing partial differential equations

Research and Development Chemical Engineer
Chemtool Incorporated, Rockton, IL *2017-2019*
- Developed new grease products tailored to meet customer application needs and performance targets
- Designed and carried out experiments by identifying relevant parameters and data collection needs for research and improvement of grease technologies
- Identified, evaluated and implemented cost savings in raw materials, formulations and production efficiency
- Provided technical knowledge and testing support to add value to the customer experience

Research and Development Intern
Chemtool Incorporated, Rockton, IL *Summer 2016*
- Worked on R&D projects to improve the performance and cost efficiency of grease thickener chemistries

Undergraduate Researcher
New York University, Supervisor: Bruce Garetz *Summer 2015*
- Independently managed project investigating the non-photochemical laser induced nucleation phenomena, which can control crystal structure and properties, making the phenomena relevant in pharmaceutical manufacturing and improving understanding of the mechanism behind crystal nucleation
- Presented findings at the Materials Research Science and Engineering Centers (MRSEC) REU showcase

Projects

Bounded-Confidence Models of Opinion Dynamics
UCLA, Advisor: Mason Porter *Fall 2020-Present*
- Developing bounded-confidence models of opinion dynamics that incorporate heterogeneous activation probabilities to capture the varied frequencies of social interaction in social networks
- Characterizing resulting effects on qualitative model behaviors including consensus and opinion fragmentation
- Investigating node-centrality measures to identify influential nodes in opinion-dynamics models by taking into account node weight, position in the network, and opinions differences of surrounding nodes

Twitter Response of Fortune-100 Companies to Racial Justice
UCLA, Applied Math Seminar *Spring 2021*
- Utilized non-negative matrix factorization for topic analyis of Fortune-100 tweets from summer 2020
- Determined the shift and focus of the Twitter conversation over time for topics such as racial justice, COVID-19, CEO statements, and celebrations by using dynamic topic models
- Conducted exploratory data analysis on Fortune-100 Twitter profiles and activity to identify key companies in the Twitter conversation during this time period under various metrics

Congressional Voting Analysis
UCLA, Applied Math Seminar *Fall 2020*
- Analyzed data from United States congressional roll-call votes using community-discovery methods for networks to classify political-party affiliation and investigate political polarization over time

Social Forces in Twitter Networks of Senators
UCLA, Statistics on Networks Course *Fall 2020*
- Used the Twitter API to construct a social network of Senate Twitter interactions among the 116th US Senate
- Fit exponential random graph models (ERGMs) to the Senate Twitter network to idenfity underlying social forces for network ties such as the effects of political party, age, geographic region and transitivity

Chem-E-Car, Co-President (2015-2017)
Cooper Union, American Institute of Chemical Engineers (AIChE) Competition *2014-2017*
- Led a team to design a shoebox sized vehicle powered by pressurized carbon dioxide generated on the vehicle by the chemical reaction between magnesium carbonate and citric acid
- Devised and conducted experiments to optimize operating conditions and reaction control
- Made design decisions considering factors such as innovation, safety, practicality, cost and time constraints
- Composed a detailed documentation package addressing safety considerations and key design features
- Placed 2nd at the AIChE Regional Conference in spring 2017, allowing advancement to national competition

Flu Vaccine Production Plant Design
Cooper Union, Process Design & Evaluation Course *Spring 2017*
- Designed a manufacturing facility to produce cell-based flu vaccines for the North American market
- Developed process flow sheet with detailed equipment sizes and specifications, analyzed safety and environmental considerations and conducted economic analysis of the facility

Analysis of Frying of Vegetables
Cooper Union, Advanced Heat & Mass Transfer Course *Spring 2017*
- Simulated, using COMSOL software, the frying of various vegetables in different geometries and modeled their moisture loss and heat transfer over time

Optimal Student Diet
Cooper Union, Convex Optimization Course *Fall 2016*
- Created a scraper to pull and sort recipe ingredients, costs and nutritional value from assorted websites
- Utilized MATLAB to solve the linear optimization problem to minimize food cost while varying constraint parameters including nutrition requirements, variety in diet and maximum cook time
- Conducted sensitivity analysis using shadow prices and identified robust recipes to achieve a balanced diet

Student Inquiry and Research Program
Illinois Math and Science Academy, Supervisor: Brian Murphy *2012 - 2013*
- Determined that the less studied genera of marine derived bacteria may be a potentially rewarding source of bioactive compounds for antibiotic drug-lead discovery
- Found eight marine derived bacteria strains that produced metabolites which were found to be potentially active against *Enterococcus faecalis*, a pathogen that is a problem in the hospital environment due to growing antimicrobial resistance
- Presented at IMSAloquium, an annual high school student conference

Technical Skills

Computer: Python, MATLAB, R, C++, LaTeX, AutoCAD, SolidWorks

Analytical Chemistry: FT-IR, NMR, HPLC, Petroleum testing methods

Scholarship and Awards

NSF Research Trainee Sep 2019 - Sep 2021
Modeling and Understanding Human Behavior: Harnessing the Data Revolution

Cooper Union Full Tuition Scholarship Sep 2013 - May 2017

Omega Chi Epsilon Co-President Sep 2016 - May 2017
National Honor Society for Chemical Engineering

Cooper Union Undergraduate Senior Awards Spring 2017
Norman L. Perry Internship Award
Howard M. Siegel Memorial Prize
Robert Spice Fund Prize

Organizing and Outreach

UCLA Women in Mathematics Organizer Sep 2020 - Present

UCLA Exploring Your Universe Volunteer Fall 2020

Omega Chi Epsilon Co-President Sep 2016 - May 2017
National Honor Society for Chemical Engineering