

# Jiayi (Joanna) Li

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CONTACT INFORMATION      UCLA Dept. of Statistics & Data Science  
8145 Math Sciences Bldg.      Email: [jiayi.li@g.ucla.edu](mailto:jiayi.li@g.ucla.edu)  
Los Angeles, CA 90095, USA      Homepage: [jl2ml.github.io](http://jl2ml.github.io)

EDUCATION      **University of California, Los Angeles, CA, USA**  
Ph.D. Statistics  
Mathematical Machine Learning, Algebraic Statistics  
Thesis advisor: Guido Montúfar

**The University of Hong Kong & Stony Brook University, New York, USA**  
B.S. Mathematics  
Algebraic Geometry  
Thesis advisor: Robert Lazarsfeld

RESEARCH EXPERIENCE      **Max Planck Institute of Molecular Cell Biology and Genetics (MPI-CBG)**  
*Dresden, Germany (Host: Prof. Heather Harrington)*  
Research Scientist, 01/2025 -

**Institute for Pure & Applied Mathematics (IPAM)**  
*Los Angeles, CA, USA*  
Graduate Fellow, *Long Program: Mathematics of Intelligences*, 09/2024 - 12/2024

**Simons Institute for the Theory of Computing**  
*Berkeley, CA, USA*  
Short-Term Visitor, *Modern Paradigms in Generalization*, 11/2024 - 12/2024  
Short-Term Visitor, *Summer Cluster: Deep Learning Theory*, 08/2022

**St John's College, University of Oxford**  
*Oxford, UK*  
Short-Term Visitor, *Workshop for Women in Algebraic Statistics*, 07/2024

**Institute for Mathematical & Statistical Innovation (IMSI)**  
*Chicago, IL, USA*  
Short-Term Visitor, *Learning Collective Variables and Coarse Grained Models*, 04/2024  
Long-Term Visitor, *Algebraic Statistics and Our Changing World*, 09/2023 - 12/2023

**Max Planck Institute for Mathematics in the Sciences (MPI MiS)**  
*Leipzig, Germany*  
Visiting Researcher, *Mathematical Machine Learning*, 07 - 09/2023, 07 - 08/2024

**University of California, Los Angeles (UCLA)**  
*Los Angeles, CA, USA*  
Graduate Researcher, *Mathematical Machine Learning*, 09/2019 - 03/2025

**Caltech**  
*Pasadena, CA, USA (Collaborator: Prof. Matt Thomson)*  
Pre-doctoral Researcher, *Mathematical Machine Learning*, 09/2018 - 06/2019

**Stony Brook University**  
*Stony Brook, NY, USA*

Undergraduate Researcher, *Algebraic Geometry*, 09/2017 - 06/2018

TEACHING  
EXPERIENCE

**Teaching Summary:**

Instructor/TA 28 times for 8 courses/training programs, with 1000+ students enrolled in-person and/or online, at UCLA (MSOL, Statistics) and University of Oxford.

**Fall 2024, Teaching Fellow, UCLA MSOL**

28. ENGR 205 - Model-Based Systems Engineering  
Instructor: Dr. Myron J. Hecht (Aerospace Corporation)

**Fall 2024, Instructor, UCLA Department of Statistics**

27. Maths Camp for Master of Applied Statistics & Data Science (MASDS) Program

**Summer 2024, Teaching Fellow, UCLA MSOL**

26. ENGR 203 - System Architecture  
Instructor: Dr. Steven J. Silverman (Northrop Grumman)  
25. ENGR 116 - Statistics for Management Decisions  
Instructor: Dr. Alireza Mehrnia

**Summer 2024, Teaching Assistant, University of Oxford**

24. Oxford Machine Learning Summer School  
Instructor: Dr. Mihaela van der Schaar (University of Cambridge)

**Spring 2024, Teaching Associate, UCLA MSOL**

23. ENGR 202 - Reliability, Maintainability, and Supportability  
Instructor: Dr. Myron J. Hecht

**Winter 2024, Teaching Associate, UCLA MSOL**

22. ENGR 200 - Program Management Principles for Engineers and Professionals  
Instructors: Dr. Jay F. Chance (Boeing), Dr. Leslie M. Lackman

**Fall 2023, Teaching Associate, UCLA MSOL**

21. ENGR 205 - Model-Based Systems Engineering  
Instructor: Dr. Myron J. Hecht

**Fall 2023, Instructor, UCLA Department of Statistics**

20. Maths Camp for Master of Applied Statistics & Data Science (MASDS) Program

**Summer 2023, Teaching Associate, UCLA MSOL**

19. ENGR 203 - System Architecture  
Instructor: Dr. Steven J. Silverman  
18. ENGR 116 - Statistics for Management Decisions  
Instructor: Dr. Alireza Mehrnia

**Spring 2023, Teaching Associate, UCLA MSOL**

17. ENGR 202 - Reliability, Maintainability, and Supportability  
Instructor: Dr. Myron J. Hecht

**Winter 2023, Teaching Associate, UCLA MSOL**

16. ENGR 200 - Program Management Principles for Engineers and Professionals  
Instructor: Dr. Jay F. Chance

**Fall 2022, Teaching Associate, UCLA MSOL**

15. ENGR 205 - Model-Based Systems Engineering

Instructor: Dr. Myron J. Hecht

**Fall 2022, Instructor, UCLA Department of Statistics**

14. Maths Camp for Master of Applied Statistics (MAS) Program

**Summer 2022, Teaching Associate, UCLA MSOL**

13. ENGR 203 - System Architecture

Instructor: Dr. Steven J. Silverman

**Spring 2022, Teaching Associate, UCLA MSOL**

12. ENGR 202 - Reliability, Maintainability, and Supportability

Instructor: Dr. Myron J. Hecht

**Winter 2022, Teaching Associate, UCLA MSOL**

11. ENGR 200 - Program Management Principles for Engineers and Professionals

Instructor: Dr. Leslie M. Lackman

**Fall 2021, Teaching Associate, UCLA MSOL**

10. ENGR 205 - Model-Based Systems Engineering

Instructor: Dr. Myron J. Hecht

**Fall 2021, Instructor, UCLA Department of Statistics**

9. Maths Camp for Master of Applied Statistics (MAS) Program

**Summer 2021, Instructor, UCLA Department of Statistics**

8. STATS 13 DIS 2A/2B - Intro to Statistical Methods for Life and Health Sciences

**Summer 2021, Teaching Associate, UCLA MSOL**

7. ENGR 203 - System Architecture

Instructor: Dr. Steven J. Silverman

**Spring 2021, Teaching Associate, UCLA MSOL**

6. ENGR 202 - Reliability, Maintainability, and Supportability

Instructor: Dr. Myron J. Hecht

**Winter 2021, Teaching Associate, UCLA MSOL**

5. ENGR 200 - Program Management Principles for Engineers and Professionals

Instructor: Dr. Leslie M. Lackman

**Fall 2020, Teaching Assistant, UCLA MSOL**

4. ENGR 205 - Model-Based Systems Engineering

Instructor: Dr. Myron J. Hecht

**Summer 2020, Teaching Assistant, UCLA MSOL**

3. ENGR 116 - Statistics for Management Decisions

Instructors: Dr. Hamed Mamani (University of Washington), Dr. Lara Dolecek

**Spring 2020, Teaching Assistant, UCLA MSOL**

2. ENGR 202 - Reliability, Maintainability, and Supportability

Instructor: Dr. Myron J. Hecht

**Winter 2020, Teaching Assistant, UCLA MSOL**

1. ENGR 200 - Program Management Principles for Engineers and Professionals

Instructor: Dr. Vandana Mangal

- 13. Numerical (Nonlinear) Algebra in the Real World**  
02/06/2025, Dresden, Germany  
“Taming Non-convexity in Shallow Neural Networks with Algebraic Activations”
- 12. Joint Mathematics Meetings (JMM) 2025**  
AMS-ASA-SIAM Special Session on Mathematics of Deep Learning: A High-Dimensional Probability Perspective  
01/11/2025, Seattle, WA, USA  
“Algebro-geometric Approaches to Optimization and Generalization in Mathematical Machine Learning”
- 11. 2024 UC Davis Peter Hall Conference on Statistics in the Age of AI**  
11/09/2024, Davis, CA, USA  
“Optimization in Polynomial Neural Networks: Insights from Algebraic Geometry”
- 10. Algebraic Geometry and Machine Learning Workshop, SIAM Conference on Mathematics of Data Science**  
10/25/2024, Atlanta, GA, USA  
“Geometry of Polynomial Neural Networks”
- 9. Women in Algebraic Statistics Workshop, St John’s College, University of Oxford**  
07/12/2024, Oxford, UK  
“Algebraic Structures in Terminal Phase of Neural Network Training”
- 8. Numerical Analysis Seminar, Institute of Mathematical Research/Dept. of Maths, The University of Hong Kong**  
04/30/2024, Hong Kong  
“Geometry of Polynomial Neural Networks”
- 7. Special Session: Applications of Algebra and Geometry, AMS 2024 Spring Central Sectional Meeting**  
04/20/2024, Milwaukee, WI, USA  
“An Algebraic Approach to Supply Network Formation and Fragility”
- 6. Dept. of Mathematics and Statistics, University of Mass. Amherst**  
04/12/2024, Online  
“Geometry of Polynomial Neural Networks”
- 5. Level Set Seminar (led by Prof. Stanley Osher), Dept. of Maths, UCLA**  
04/08/2024, Los Angeles, CA, USA  
“Geometry of Polynomial Neural Networks”
- 4. Applied Algebra Seminar, Dept. of Maths, University of Wisc. Madison**  
12/2023, Madison, WI, USA  
“Geometry of Polynomial Neural Networks”
- 3. Institute for Mathematical and Statistical Innovation (IMSI)**  
10/2023, Chicago, IL, USA  
“Algebraic Structures in Terminal Phase of Neural Network Training”
- 2. Deep Learning Theory Seminar, UCLA**  
09/2023, Los Angeles, CA, USA  
“Neural Collapse Beyond Unconstrained Feature Models”

## 1. SCISS, UCLA

07/2023, Los Angeles, CA, USA

“Mathematical Machine Learning: Theory & Beyond”

ACADEMIC AND  
COMMUNITY  
SERVICES

### Joint Mathematics Meetings (JMM) 2025

1/8/2025 - 1/11/2025, Seattle, WA, USA

AMS Special Session on Algebraic Methods in Machine Learning and Optimization

Organizers: **Jiayi Li\*** (UCLA, USA), Guido Francisco Montufar (MPI MiS, Germany), Yulia Alexandr (UCLA, USA), Julia Lindberg (UT Austin, USA)

### Association for Computing Machinery (ACM) XRDS Magazine

Editor-in-Chief, 2022 - present

Lead Editor, Digital Content Editor, 2021

Feature Editor, 2020

### Outreach

Distinguished Women in Statistics and Data Science Workshop Series 1st (Women in Academia, 05/23/2023), 2nd Symposium (Women in Industry, 10/17/2023)

UCLA Society of Women in Statistics (Chair, 2022 - )

UCLA Statistics Club (Mentor, 2022 - )

Rotary Club, Westwood Village, CA (Invited Speaker, 09/07/2023)

UCLA Bruin Professionals, Westwood, CA (Invited Speaker, 05/16/2024)

Dublin High School, Dublin, CA (Invited Speaker, 10/25/2024)

SELECTED  
PUBLICATIONS

### Working Papers

4. **Jiayi Li**, Angélica Torres, Guido Montufar. “*Critical Points of Rational Neural Networks and Landscape Properties*”.

3. Jane Coons, Nataliia Kushnerchuk, **Jiayi Li**, Sarah Lumpp, Janike Oldekop, Elina Robeva. “*Parameter Identification in Discrete Lyapunov Models*”.

2. **Jiayi Li**, Guido Montufar. “*Optimization Landscape of Extended Unconstrained Feature Model*”.

1. **Jiayi Li**, Jose Israel Rodriguez. “*An Algebraic Approach to Supply Network Formation and Fragility*”.

### Research Publications

7. Yulia Alexandr, Miles Bakenhus, Mark Curiel, Sameer K. Deshpande, Elizabeth Gross, Yuqi Gu, Max Hill, Joseph Johnson, Bryson Kagy, Vishesh Karwa, **Jiayi Li**, Hanbaek Lyu, Sonja Petrović, Jose Israel Rodriguez. “*New Directions in Algebraic Statistics: Three Challenges from 2023*”, Algebraic Statistics.

6. Kaie Kubjas, **Jiayi Li**, Maximilian Wiesmann. “*Geometry of Polynomial Neural Networks*”, Algebraic Statistics.

5. Shuang Liang, Renata Turkes, **Jiayi Li**, Nina Otter, Guido Montufar. “*Pull-back Geometry of Persistent Homology Encodings*”, Transactions on Machine Learning Research (TMLR), 2024.

4. **Jiayi Li**, Yuantong Li, Xiaowu Dai. “*Discussion: Estimating Means of Bounded Random Variables by Betting*” by Waudby-Smith and Ramdas”, Journal of the Royal Statistical Society: Series B (JRSSB), 2023.

3. Dejun Guo, Xu Jin, Dan Shao, **Jiayi Li**, Yang Shen, Huan Tan. “*Image-Based Regulation of Mobile Robots without Pose Measurements*”, IEEE Control Systems Letters (L-CSS), vol. 6, pp. 2156-2161, 2022.

2. Guruprasad Raghavan, **Jiayi Li**, and Matt Thomson. “*Geometric Algorithms for Predicting Resilience and Recovering Damage in Neural Networks*”, preprint.

1. Ziqi Huang, Yang Shen, **Jiayi Li**, Marcel Fey, Christian Brecher. “*A Survey on AI-*

*Driven Digital Twins in Industry 4.0: Smart Manufacturing and Advanced Robotics*, Sensors, 2021.

#### Editorial Articles

10. **Jiayi Li**, “*Advice: Navigating the Academic Path: Insights from Professor Jens Palsberg*”. XRDS 31, 1 (Fall 2024), pp. 10-11, 2024.
9. **Jiayi Li**, “*Letter from the Editors: Exploring the Frontiers of Machine Learning in Education*”. XRDS 31, 1 (Fall 2024), pp. 5-5, 2024.
8. Jasmine Lu, **Jiayi Li**, “*Technology is Not Neutral: Locating Sites of Resistance as Computing Students*”. XRDS 30, 4 (Summer 2024), pp. 5-6, 2024.
7. **Jiayi Li**, Konstantin Klemmer, “*Unveiling Patterns of the Earth through Machine Learning and Geospatial Analysis*”. XRDS 30, 3 (Spring 2024), pp. 32-33, 2024.
6. **Jiayi Li**, “*Letter from the Editors: Join Our Team: A Unique Opportunity for Aspiring Computer Science Students*”. XRDS 30, 3 (Spring 2024), pp. 5-6, 2024.
5. **Jiayi Li**, “*Code of Life: Unraveling Biological Mysteries through Computational Innovation*”. XRDS 30, 2 (Winter 2023), pp. 5-6, 2024.
4. **Jiayi Li**, “*Computational Creativity: Bridging Art and Computer Science*”. XRDS 29, 4 (Summer 2023), pp. 5-6, 2023.
3. **Jiayi Li**, “*Letter from the Editors: Looking Ahead, 2023 and Beyond*”. XRDS 29, 2 (Winter 2022), pp. 5-6, 2023.
2. **Jiayi Li**, Karan Ahuja, “*Making with a Sustainable Purpose: an Interview with Matthew L. Mauriello*”. XRDS 27, 4 (Summer 2021), pp. 38-41, 2021.
1. **Jiayi Li**, Yingfei Wang, “*An Interview with Owen McCall from TREECYCLE*”. XRDS 27, 4 (Summer 2021), pp. 42-45, 2021.

#### HONORS, AWARDS AND GRANTS

Dimitris N. Chorafas Foundation Award (*as 1 of 31 awardees globally*), 2024  
Dissertation Year Fellowship, UCLA, 2024  
Distinguished Teaching Assistant Award Nominee of Statistics/MSOL, UCLA, 2024  
Travel Grant, St John’s College, University of Oxford, 2024  
Travel Grant, Statistics in the Age of AI, Washington, DC, 2024  
Travel Grant, MPI-CBG, 2024  
Travel Grant, Institute for Mathematical and Statistical Innovation (IMSI), 2023, 2024  
Travel Grant, Simons Institute for the Theory of Computing, Berkeley, CA, USA, 2022  
Travel Grant, Algebraic Statistics Conference, Honolulu, HI, USA, 2022  
Summer Mentored Research Fellowship, UCLA, 2022  
Travel Grant, International Conference on Machine Learning (ICML), 2020, 2021  
Travel Grant, International Conference on Learning Representation (ICLR), 2020, 2021  
ACM-W Scholarship, Association of Computing Machinery, 2020  
Cathay Bank Scholarship, 2020  
Travel Grant, PyData LA, 2019  
William Lowell Putnam Competition, SBU University Team, 2017, 2018  
Travel Grant, MSRI (now SLMATH), 2017  
Overseas Research Fellowship, HKU, 2016  
Undergraduate Research Fellowship, HKU, 2015

#### MEMBERSHIPS

American Statistical Association (ASA)  
Institute of Mathematical Statistics (IMS)  
Association for Computing Machinery (ACM)