Fangyuan Lin

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EDUCATION

University of California, Berkeley May. 2020 – Aug. 2024
*B.A. in **Mathematics** and **Computer Science** (GPA: 3.953/4)* Berkeley, CA

- **Dorothea Klumpke Roberts Prize in Mathematics**: "awarded to seniors who have demonstrated truly exceptional scholarship in mathematics, with a cash prize." [link]
- **Highest Honors in Mathematics**
- **Outstanding Undergraduate Student Instructor Award** [link]

PUBLICATIONS & PREPRINTS

1. **Revisiting the Unicity Distance through a Channel Transmission Perspective**
   Fangyuan Lin (2024). *Preprint, Submitted for Publication.* (arXiv:2410.14816)
2. **From Local Interactions to Global Patterns: An Analysis of Silk Density in Spider Webs**
   Fangyuan Lin, Jason Jiang, Seewoo Lee, Grant Yang, Norman Sheu (in preparation).
3. **Applications of the Theory of Aggregated Markov Processes in Stochastic Learning Theory**
   Fangyuan Lin (2023). *arXiv Preprint.* (arXiv:2311.01476)

RESEARCH EXPERIENCE

Research Assistant (Optional Practical Training) Aug. 2024 – Present
Research Assistant to Professor Steven N. Evans (UC Berkeley) Berkeley, CA

- Developed programs to identify non-isomorphic simple edge-weighted trees with the same joint distribution of the random length vector, extending the work *Recovering a Tree from the Lengths of Subtrees Spanned by a Randomly Chosen Sequence of Leaves*.
- Contributing to ongoing theoretical research in stochastic processes, focusing on extending the assumptions of mean-field interacting multi-type birth-death processes.

Revisiting the Unicity Distance through a Channel Transmission Perspective May. 2024 – Oct. 2024
Independent project supervised by Professor Per-Olof Persson (UC Berkeley) Berkeley, CA

- Designed and implemented algorithms to break simple substitution ciphers using frequency analysis, Markov chain Monte Carlo, and machine learning, under the supervision of Professor Persson.[code]
- Studied the expected lower bound on message length required for feasible attacks from an information-theoretic approach and presented a novel proof of the unicity distance formula using reliable communication theory, under the supervision of Professor Steven Evans. [paper]

GeoDes (Geometry in Design) Lab, UC Berkeley May. 2024 – Present
Undergraduate Researcher Berkeley, CA

- Collaborating on interdisciplinary research exploring geometric properties of spider web structures, including surface reconstruction, cusp points, and silk density.
- Co-authoring a paper currently in preparation, presenting findings on silk density patterns and their role in inferring structural properties of spider webs.

When is a function of a Markov process Markov? May. 2023 – Aug. 2023
Summer Undergraduate Research Fellowship (UC Berkeley) Berkeley, CA

- Supervised by Professor Steven N. Evans on literature review of aggregated Markov processes and stochastic learning theory and received a stipend of $5000 as part of the Summer Undergraduate Research Fellowship.
- Presented novel applications of classical results on aggregated Markov processes to substantiate the Markovian properties of models within stochastic learning theory. [paper]

DIRECTED READING

Graduate-Level Differential Geometry May. 2024 – Present
Supervisor: Dr. Norman Sheu (UC Berkeley) Berkeley, CA

- Studied *Introduction to Manifolds* by Loring W. Tu and participated in weekly half-hour discussions with Dr. Sheu.
- Developed detailed notes. The source code is available here: [LaTeX Source Code]

Graduate-Level Information Theory May. 2024 – Aug. 2024
Supervisor: Professor Steven N. Evans (UC Berkeley) Berkeley, CA

- Studied the classical text *Elements of Information Theory* by Joy A. Thomas and Thomas M. Cover and participated in weekly one-hour discussions with Professor Evans.
- Produced comprehensive notes and problem set solutions. [LaTeX Source Code]

ACADEMIC AWARDS AND SCHOLARSHIPS

Dorothea Klumpke Roberts Prize in Mathematics, 2023-24 [link]; *Department of Mathematics, UC Berkeley*
Highest Honors in Mathematics, 2023-24; *Department of Mathematics, UC Berkeley*
Outstanding (Under)Graduate Student Instructor Award, 2023-24 [link]; *The Graduate Division, UC Berkeley*
High Distinction in General Scholarship 2023-24; *College of Letters and Science, UC Berkeley*
High Distinction in General Scholarship 2023-24; *College of Computing, Data Sci, & Society, UC Berkeley*
Summer Undergraduate Research Fellowship ($5,000 USD), 2023 [link]; *UC Berkeley*

TEACHING EXPERIENCE

MATH 54: Linear Algebra & Differential Equations Jan. 2024 – May. 2024
Teaching Assistant for Professor Zvezdelina Stankova (UC Berkeley) Berkeley, CA

- Taught 6 discussion sections per week and held 2 office hours, managing grading, proctoring, and administrative duties for a class of 56 students.
- Received exceptional feedback in official course evaluations and recognized as an **Outstanding Undergraduate Student Instructor**. [Teaching Evaluation]

MATH 1B: Calculus Aug. 2023 – Dec. 2023
Teaching Assistant for Dr. Norman Sheu (UC Berkeley) Berkeley, CA

- Taught 6 discussion sections per week and held 2 office hours, managing grading, proctoring, and worksheet creation for a class of 48 students.
- Received exceptional feedback in official course evaluations and recognized as an **Outstanding Undergraduate Student Instructor**. [Teaching Evaluation]

OTHER EMPLOYMENT HISTORY

MATH 104: Introduction to Analysis Jun. 2023 – Aug. 2023
Reader for Dr. Norman Sheu (UC Berkeley) Berkeley, CA

- Composed detailed grading rubrics and prepared comprehensive exam solutions.
- Graded homework assignments and exams with a focus on consistency and fairness.

MATH 160: History of Mathematics Jan. 2023 – May. 2023
Reader for Professor Ole H. Hald (UC Berkeley) Berkeley, CA

- Assisted with grading assignments and supported administrative tasks for the course.

Mathematics & Statistics Tutor Jun. 2021 – Aug. 2022
Student Learning Center, UC Berkeley Berkeley, CA

- Provided tutoring and academic advising for courses including MATH 1A&B Calculus, MATH 54 Linear Algebra & Differential Equations, and MATH 55 Discrete Mathematics.
- Conducted 7 hours of tutoring per week, helping students grasp complex mathematical concepts, solve problems, and prepare for exams.

Mathematics: MATH 53 *Multivariable Calculus* (**A**), MATH 54 *Linear Algebra and ODE* (**A**+), MATH 55 *Discrete Math* (**A**), MATH 74 *Intro to Upper-Div Math* (**A**+), MATH 104 *Real Analysis* (**A**), MATH 106 *Probability Theory* (**A**+), MATH 110 *Abstract Linear Algebra* (**A**+), MATH 113 *Abstract Algebra* (**A**), MATH 115 *Number Theory* (**A-**), MATH 124 *Programming in Math* (**A**+), MATH 128A *Numerical Analysis* (**A**+), MATH 135 *Set Theory* (**A**), MATH 141 *Differential Topology* (**A-**), MATH 142 *Algebraic Topology* (**A**), MATH 160 *Math History* (**A**), MATH 185 *Complex Analysis* (**A**+), MATH 196 *Honors Thesis* (**A**), MATH 199 *Independent Study*, MATH 202A *Graduate Analysis* (**A-**), MATH 205 *Graduate Complex Analysis* (**A**)
Other Technical Courses: STAT 150 *Stochastic Processes* (**A**), CS 61A *Program Structures* (**A**), CS 61B *Data Structures* (**A**), CS 161 *Computer Security* (**A**), CS 171 *Cryptography* (**A**), CS 188 *Artificial Intelligence* (**A**+), EECS 126 *Probability & Random Processes* (**A**), EECS 127 *Convex Optimization* (**A**), PHYSICS 7A *Mechanics* (**A**), PHYSICS 7B *Heat & Electricity* (**A**)

SKILLS & MISC.

- *Language* English (professional), Mandarin (native)
- *Programming* C, Golang, Java, Matlab, Julia, Mathematica, Python, Scheme, SQL
- *Tools* LaTeX, Anaconda, Git, Abode Illustrator.
- *Hobbies* Violin, piano, running, bodybuilding, *etc.*