

# Mason Gao

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## Education

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**Columbia University**, New York City, NY

Doctor of Philosophy in Operations Research

Incoming Aug 2026

**Tufts University**, Medford, MA

3.96 GPA

B.S, Major in Mathematics

Feb 2026

## Research/Experience

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**North Carolina State University**, *REU Researcher*

*May 2025 – Present*

- Conducting research on mathematical optimization, computational linear algebra, and linear programming under Professor Adolfo Escobedo, with a focus on improving performance and accuracy of the simplex algorithm for QSOPT\_EX, an exact linear programming solver.
- Developed a novel multi-column LU update algorithm that enhances LU update efficiency by over one order of magnitude; integrated into QSOPT\_EX's 100k+ line C codebase, significantly reducing runtimes.
- Developed a perturbation-based framework to generate numerically unstable optimization problems for rigorous solver robustness testing; refined techniques by analyzing perturbation types and magnitudes.

**Tufts University, Department of Mathematics**, *Researcher*

*Jun 2024 – Mar 2025*

- Conducted research on mathematical optimization and Optimal Transport under Professor James Murphy, with a focus on applying Optimal Transport theory to geographical data representations.
- Independently implemented self-tuning spectral clustering to research modeling molecular dynamics using Optimal Transport, improving cluster identification and analysis of molecular states.
- Developed a data processing pipeline to extract geographically distributed probability measures from the Cumulative Election Survey, a comprehensive dataset of over 600,000 respondents and 600 data characteristics, creating test cases for future geographical barycentric research and analysis.

**Tufts University, Department of Mathematics**, *Grading Assistant*

*Jan 2024 – May 2025*

- Efficiently managed the grading of weekly assignments for Math 65 (Bridge to Higher Mathematics), a course with 30+ students, grading 500+ Math 65 proofs over 3 semesters.
- Conducted weekly office hours to provide individualized guidance on proof-writing techniques; delivered targeted feedback that strengthened logical reasoning and improved overall student performance.

## Publications

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- **Gao, M.**, Grassel, J. T., & Escobedo, A. R. (2026, March 20). Efficient Multi-Column LU Factorization Updates for Exact Linear Programming. Refereed Proceedings of the 2026 INFORMS Optimization Society Conference (IOS2026), Atlanta, GA, USA. <https://doi.org/10.5281/zenodo.19985115>

## Awards/Honors

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- NSF Graduate Research Fellowship Program (GRFP)

2026-2029