

# Joyce A. Chew

*Mathematics Ph.D candidate*

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## Research Interests

Learning on manifolds, low-rank matrix and tensor approximations, bias in machine learning

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## Education

- 2020–present **Ph.D in Mathematics**, *University of California, Los Angeles*  
Advisor: Deanna Needell
- 2023 **C.Phil. in Mathematics**, *University of California, Los Angeles*
- 2022 **M.A. in Mathematics**, *University of California, Los Angeles*
- 2020 **B.S. in Mathematics, Honors**, *Calvin University*, Grand Rapids, MI  
Honors thesis: Applications of algebra in bifurcation theory  
Minor in Computer Science
- 2020 **B.A. in Chemistry**, *Calvin University*, Grand Rapids, MI

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## Honors and Awards

- 2022 UCLA Raymond Redheffer Prize
- 2020 NSF Graduate Research Fellowship
- 2019 National Center for Women and Information Technology Collegiate Award Finalist
- 2018 Goldwater Scholarship Honorable Mention
- 2016 Calvin University Student Research Fellowship

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## Publications

\* denotes undergraduate author.

### Preprints

- [A1] E. George, **J. A. Chew**, and D. Needell. Detecting and mitigating indirect stereotypes in word embeddings. *arXiv preprint*, 2023. doi:10.48550/arXiv.2305.14574.
- [A2] **J. A. Chew**, E. De Brouwer, S. Krishnaswamy, D. Needell, and M. Perlmutter. Manifold filter-combine networks. *arXiv preprint*, 2023. doi:10.48550/arXiv.2307.04056.
- [A3] W. Diepeveen, **J. A. Chew**, and D. Needell. Curvature corrected tangent

space-based approximation of manifold-valued data. *arXiv preprint*, 2023. doi:10.48550/arXiv.2306.00507.

#### Conference/Workshop Papers

- [B1] A. Venkat, **J. A. Chew**, F. C. Rodriguez, C. J. Tape, M. Perlmutter, and S. Krishnaswamy. Directed scattering for knowledge graph-based cellular signaling analysis. *arXiv preprint*, 2023. doi:10.48550/arXiv.2309.07813. Accepted to ICASSP 2024.
- [B2] **J. A. Chew**, D. Needell, and M. Perlmutter. A convergence rate for manifold neural networks. In *2023 International Conference on Sampling Theory and Applications (SampTA)*, pages 1–5. IEEE, 2023. doi:10.1109/SampTA59647.2023.10301407.
- [B3] **J. A. Chew**, H. Steach, S. Viswanath, H.-T. Wu, M. Hirn, D. Needell, M. D. Vesely, S. Krishnaswamy, and M. Perlmutter. The manifold scattering transform for high-dimensional point cloud data. In *Topological, Algebraic and Geometric Learning Workshops 2022*, volume 196, pages 67–78. PMLR, 2022. URL <https://proceedings.mlr.press/v196/chew22a.html>.

#### Journal Papers

- [C1] **J. A. Chew**, M. Hirn, S. Krishnaswamy, D. Needell, M. Perlmutter, H. Steach, S. Viswanath, and H.-T. Wu. Geometric scattering on measure spaces. *Applied and Computational Harmonic Analysis*, to appear, 2024.
- [C2] K. Cheng\*, S. Inzer\*, A. Leung\*, X. Shen\*, M. Perlmutter, M. Lindstrom, **J. A. Chew**, T. Presner, and D. Needell. Multi-scale hybridized topic modeling: A pipeline for analyzing unstructured text datasets via topic modeling. *SIAM Undergraduate Research Online*, 16, April 2023. doi:10.1137/22S1536832.
- [C3] N. P. Kazmierczak, **J. A. Chew**, and D. A. Vander Griend. Bootstrap methods for quantifying the uncertainty of binding constants in the hard modeling of spectrophotometric titration data. *Analytica Chimica Acta*, 1227:339834, September 2022. doi:10.1016/j.aca.2022.339834.
- [C4] N. P. Kazmierczak, **J. A. Chew**, and D. A. Vander Griend. A reliable algorithm for calculating stoichiometry parameters in the hard modeling of spectrophotometric titration data. *Journal of Chemometrics*, 36(6):e3409, May 2022. doi:10.1002/cem.3409.
- [C5] P. Li\*, C. Tseng\*, Y. Zheng\*, **J. A. Chew**, L. Huang, B. Jarman, and D. Needell. Guided semi-supervised non-negative matrix factorization. *Algorithms*, 15(5):136, April 2022. doi:10.3390/a15050136.
- [C6] N. P. Kazmierczak, **J. A. Chew**, A. R. Michmerhuizen, S. E. Kim, Z. D. Drees, A. Rylaarsdam, T. Thong, L. Van Laar, and D. A. Vander Griend. Sensitivity limits for determining 1: 1 binding constants from spectrophotometric titrations via global analysis. *Journal of Chemometrics*, 33(5):e3119, 2019. doi:10.1002/cem.3119.

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## Talks

- 2023 **A Convergence Rate for Manifold Neural Networks**, *SampTA 2023*
- 2023 **Uncovering Structure in High-Dimensional Data**, *Calvin University Mathematics and Statistics Colloquium*
- 2022 **Geometric Scattering on Non-Euclidean Data**, *SIAM MDS 22*
- 2019 **Slinkies, Gorges, and Ice Cream: What I Did on My Summer Vacation**, *Calvin University Mathematics and Statistics Colloquium*
- 2019 **Tension induced instabilities of twisted springs**, *Cornell University Undergraduate Research Forum*
- 2015 **Cake and what I learned from cutting it**, *TEDxValencia High School*

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## Teaching

- Calculus I**, *UCLA*
- Calculus II**, *UCLA*
- Applied Numerical Methods**, *UCLA*

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## Mentoring

- 2023 UCLA/Los Angeles Pierce College Collaborative Undergraduate Research Experience (NSF Award)
- 2022 UCLA CAM REU: AI for Holocaust Studies (paper: [C2])
- 2021–2023 UCLA Women in Mathematics Undergraduate Mentoring
- 2021–2022 UCLA Mathematics Directed Reading Program
- 2021 UCLA CAM REU: California Innocence Project (paper: [C5])

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## Professional Memberships

- SIAM, AWM

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## Programming Languages

- Python, C, C++, MATLAB, Julia, R,  $\text{\LaTeX}$