Joyce A. Chew

Mathematics Ph.D student

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Research Interests

Graph and manifold learning, tensor decompositions, bias in machine learning

Education

2020–present **Ph.D in Mathematics**, *University of California, Los Angeles*
Advisor: Deanna Needell

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

Honors and Awards

2022 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

Publications

* denotes undergraduate author.

Preprints

[A1] **J. Chew**, D. Needell, and M. Perlmutter. A convergence rate for manifold neural networks. *arXiv preprint*, 2022. doi:10.48550/arXiv.2212.12606.

[A2] **J. Chew**, M. Hirn, S. Krishnaswamy, D. Needell, M. Perlmutter, H. Steach, S. Viswanath, and H.-T. Wu. Geometric scattering on measure spaces. *arXiv preprint*, 2022. doi:10.48550/arXiv.2208.08561.

Conference Papers

[B1] **J. 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 Geo-*

metric Learning Workshops 2022, volume 196, pages 67–78. PMLR, 2022. URL `https://proceedings.mlr.press/v196/chew22a.html`.

Journal Papers

[C1] K. Cheng*, S. Inzer*, A. Leung*, X. Shen*, M. Perlmutter, M. Lindstrom, **J. 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.

[C2] 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.

[C3] 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.

[C4] 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.

[C5] 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.

Talks

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*

Teaching

Calculus I, *UCLA*

Calculus II, *UCLA*

Applied Numerical Methods, *UCLA*

Mentoring

2022 UCLA CAM REU: AI for Holocaust Studies (paper: [C1])

2021–2022 UCLA Women in Mathematics

2021–2022 UCLA Mathematics Directed Reading Program

2021 UCLA CAM REU: California Innocence Project (paper: [C4])

Other Experience

2019–2020 **Operations Director**, *CalvinHacks at Calvin University*
Responsible for venue selection, resource allocation, and departmental communication for hackathon with 200+ participants.

2019 **Grader**, *Calvin University Department of Computer Science*
Graded weekly problem sets and projects in algorithms and data structures classes. Programming languages included C#, Java, Ada, Clojure, and Ruby.

2018–2019 **University tutor**, *Calvin University Center for Student Success*
Taught calculus, scientific computing and modeling, data structures, and algorithm fundamentals. Assisted students with Python, C++, and C# projects.

2017 **Girls Who Code facilitator**, *Calvin University Department of Computer Science*
Taught middle-school and high-school girls programming fundamentals using Python.

2017–2020 **Worship Coordinator**, *Calvin University Campus Ministries*
Responsible for planning and leading worship services 2-3 times a week. Planned and led plenary services and workshops at annual international Symposium on Worship.

Programming Languages

MATLAB, C, C++, Python, R, Julia, LaTeX