

# Joyce A. Chew

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CONTACT INFORMATION	University of California, Los Angeles Department of Mathematics 520 Portola Plaza, Math Sciences Building Los Angeles, CA 90095, USA	joycechew@math.ucla.edu (714) 757-5810
RESEARCH INTERESTS	Numerical linear algebra, optimization, stochastic iterative methods, graph and manifold learning	
EDUCATION	<b>University of California, Los Angeles</b> , Los Angeles, California USA Ph.D., Applied Mathematics <b>Expected June 2025</b> Qualifying Exams: <ul style="list-style-type: none"><li>• Numerical Analysis (Spring 2021)</li><li>• Optimization/Numerical Linear Algebra (Spring 2021)</li></ul> M.A., Mathematics <b>June 2022</b> <b>Calvin University</b> , Grand Rapids, Michigan USA B.S., Mathematics (Honors) <b>May 2020</b> Cumulative GPA: 4.00 <ul style="list-style-type: none"><li>• Honors Thesis: Applications of algebra in bifurcation theory</li><li>• Minor in Computer Science</li></ul> B.A., Chemistry <b>May 2020</b> Cumulative GPA: 4.00	
HONORS AND AWARDS	Raymond Redheffer Prize, 2022 National Science Foundation Graduate Research Fellowship, 2020 National Center for Women and Information Technology Collegiate Award Finalist, 2019 Goldwater Scholarship Honorable Mention, 2018 Calvin Student Research Fellowship, 2016	
PREPRINTS	<b>Chew, J.A.</b> ; Hirn, M.; Krishnaswamy, S.; Needell, D.; Perlmutter, M.; Steach, H.R.; Viswanath, S.; Wu, H.-T. Geometric Scattering on Measure Spaces. arXiv:2208.08561. Submitted, 2022.	
JOURNAL PAPERS	Kazmierczak, N.P.; <b>Chew, J.A.</b> ; Vander Griend, D.A. Bootstrap methods for quantifying the uncertainty of binding constants in the hard modeling of spectrophotometric titration data. <i>Analytica Chimica Acta</i> , 2022, 1227:339834.  Kazmierczak, N.P.; <b>Chew, J.A.</b> ; Vander Griend, D.A. A reliable algorithm for calculating stoichiometry parameters in the hard modeling of spectrophotometric titration data. <i>Journal of Chemometrics</i> , 2022, 36:e3409.  Li, P.; Tseng, C.; Zheng, Y.; <b>Chew, J.A.</b> ; Huang, L.; Jarman, B.; Needell, D. Guided Semi-Supervised Non-Negative Matrix Factorization. <i>Algorithms</i> , 2022, 15:136.	

Kazmierczak, N.P.; **Chew, J.A.**; Michmerhuizen, A.R.; Kim, S.E.; Drees, Z.D.; Rylaarsdam, A.; Thong, T.; Van Laar, L.; Vander Griend, D.A. Sensitivity Limits for Determining 1:1 Binding Constants from Spectrophotometric Titrations via Global Analysis. *Journal of Chemometrics*, 2019, 33:e3119.

CONFERENCE  
PAPERS

**Chew, J.A.**; Steach, H.R.; Viswanath, S.; Wu, H.-T.; Hirn, M.; Needell, D.; Krishnaswamy, S.; Perlmutter, M. The Manifold Scattering Transform for High-Dimensional Point Cloud Data. *ICML Workshop on Topology Algebra and Geometry in Machine Learning*, 2022.

PRESENTATIONS

**Chew, J.A.** Geometric Scattering on Non-Euclidean Data. *SIAM MDS 22*, San Diego, CA (conference talk, September 29, 2022).

**Chew, J.A.** and Hitrik, M. NSF GRFP Workshop. *UCLA Department of Mathematics*, Los Angeles, CA (workshop, August 8, 2022).

**Chew, J.A.** Slinkies, Gorges, and Ice Cream: What I Did on My Summer Vacation. *Calvin University Mathematics and Statistics Colloquium*, Grand Rapids, MI (oral presentation, September 26, 2019).

**Chew, J.A.** Tension induced instabilities of twisted springs. *Cornell University Undergraduate Research Forum*, Ithaca, NY (oral presentation, July 25, 2019).

**Chew, J.A.**; Kazmierczak, N.P.; Vander Griend, D.A. Defining the relationship: computer-driven characterization of the binding of host and guest molecules. *West Michigan Regional Undergraduate Science Conference*, Grand Rapids, MI (poster, November 10, 2018), and *Joint Mathematics Meetings*, Baltimore, MD (poster, January 18, 2019).

Kazmierczak, N.P.; **Chew, J.A.**; Vander Griend, D.A. The tie that binds: optimal design of equilibrium spectrophotometric titrations. *West Michigan Regional Undergraduate Science Conference*, Grand Rapids, MI (poster, November 10, 2018). *N. Kazmierczak presenting.*

Crow, E.; **Chew, J.A.**; Turner, J.M. Characterizing the Gröbner bases of generic ideals. *West Michigan Regional Undergraduate Science Conference*, Grand Rapids, MI (poster, November 4, 2017).

**Chew, J.A.** Cake and what I learned from cutting it. *TEDx Valencia High School*, Placentia, CA (oral presentation, April 23, 2015).

RESEARCH  
EXPERIENCE

**UCLA Department of Mathematics**, Los Angeles, California USA

*Graduate Student Researcher*

**June 2021-present**

*Supervisor: Prof. Deanna Needell*

Research interests:

- Numerical linear algebra
- Optimization
- Stochastic iterative methods
- Graph and manifold learning
- Natural language processing

**Cornell University Department of Mathematics**, Ithaca, New York USA  
*NSF REU* **June 2019-August 2019**

*Supervisor: Dr. Andy Borum*

Studied the equilibrium configurations of flexible helical springs using optimal control. Developed numerical methods to find unstable configurations and demonstrated the presence of saddle-node bifurcations in the equilibrium configurations of twisted springs.

**Calvin University Department of Chemistry and Biochemistry**, Grand Rapids, Michigan USA

*Student Researcher*

**May 2018 - September 2020**

*Supervisor: Prof. Douglas A. Vander Griend*

1. *Development of a parallelized, high-throughput website for equilibrium binding analysis:* Applied several classes of optimization algorithms to the simultaneous determination of reaction stoichiometry and binding constants of equilibrium systems of host-guest binding. Evaluated speed, convergence, and accuracy to devise a new hybrid algorithm. Currently implementing this new methodology in a supercomputer software package to facilitate fast, high-throughput analysis via a website interface.
2. *Mathematical and computational analysis of 1:1 equilibrium binding:* Wrote Monte Carlo simulations to determine the robustness of global analysis for determination of binding constants of 1:1 host-guest equilibrium binding. Numerically demonstrated the benefits of using mathematically-derived optimal parameters for the titration experiment.

**Calvin University Department of Mathematics and Statistics**, Grand Rapids, Michigan USA

*Student Researcher*

**May 2017 - August 2017**

*Supervisor: Prof. James Turner*

Worked towards a new proof of the 3-variable Moreno-Sociás conjecture to prove the generalized conjecture. Used computer algebra systems to compute Gröbner bases of generic ideals. Formulated a conjecture characterizing generic Gröbner bases and proved the 2-variable case.

TEACHING

Calculus I (Winter 2022)

Calculus II (Fall 2021, Spring 2022)

Applied Numerical Methods (Fall 2021, Winter 2022, Spring 2022)

OTHER  
PROFESSIONAL  
EXPERIENCE

**Calvin University Department of Computer Science**, Grand Rapids, Michigan USA

*Computer science grader*

**January 2019 - December 2019**

Graded weekly problem sets and projects in algorithms and data structures classes in C#, Java, Ada, Clojure, and Ruby.

*Girls Who Code facilitator*

**January 2017 - May 2017**

Taught middle-school and high-school girls programming fundamentals using Python.

**Calvin University Center for Student Success**, Grand Rapids, Michigan USA

*Mathematics and computer science tutor*

**September 2018 - January 2019**

Taught calculus, scientific computing and modeling, data structures, and algorithm

fundamentals. Assisted students with Python, C++, and C# projects.

**CalvinHacks at Calvin University**, Grand Rapids, Michigan USA

*Operations Director*

**February 2019 - February 2020**

Responsible for venue selection, resource allocation, and departmental communication for hackathon expecting 200+ participants.

**Calvin University Campus Ministries**, Grand Rapids, Michigan USA

*Worship Coordinator*

**August 2017 - May 2020**

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, L<sup>A</sup>T<sub>E</sub>X