Benjamin Jones

Department of Mathematics, Michigan State University

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Education

Michigan State University, East Lansing, MI

Ph.D. Mathematics — Aug 2021 – May 2026

Dissertation: *"Aspects of Applied Algebraic and Geometric Topologies"*

The University of Alabama, Tuscaloosa, AL

M.A. Mathematics — May 2021

B.S. Computer Science — Dec 2020

B.S. Mathematics — May 2020

Minor in Randall Research Scholars

Budapest Semesters in Mathematics, Hungary — Summer 2019

Research Interests

Geometric and Topological Data Analysis (GTDA), Machine Learning, Applied Sheaf Theory, Molecular Biology, Knot Theory, Complex Networks, Dynamical Systems, Climate Science

Publications and Preprints

10. Asymmetrically Weighted Dowker Persistence and Applications in Dynamical Systems
T. Timofeyev, C. Potvin, **B. Jones**, K. Kurianski, M. Lopez, and S. Tanweer
arXiv:2601.04559, (2026)

9. Unexpected Applications of AlphaFold in Molecular Sciences: A Review
J. Jiang, G. Wang, D. Li, N. Hayes, **B. Jones**, Y. Shi, H. Qiu, B. Zhang, T. Zhou, and G.-W. Wei
Annual review of Biochemistry, accepted, (2026)

8. Meta-analysis and Topological Perturbation in Interactomic Network for Anti-opioid Addiction Drug Repurposing
C. Zhang, S. Cottrell, **B. Jones**, Y. Zhu, H. Qiu, B. Zhang, T. Zhou, and J. Jiang
Journal of Chemical Information and Modeling **65**(22):12313–12330*,* (2025)

7. PETLS: PErsistent Topological Laplacian Software
B. Jones and G.-W. Wei
arXiv:2508.11560, (2025)

6. Drug Resistance Predictions Based on a Directed Flag Transformer
D. Chen, G. Liu, H. Du, **B. Jones**, J. Wee, R. Wang, J. Chen, J. Shen, and G.-W. Wei
Advanced Science **12**(36):e02756, (2025)

5. Khovanov Laplacian and Khovanov Dirac for Knots and Links
B. Jones and G.-W. Wei
Journal of Physics: Complexity **6**(2):025014, (2025)

4. Persistent Directed Flag Laplacian (PDFL)-Based Machine Learning for Protein–Ligand Binding Affinity Prediction
M. Zia, **B. Jones**, H. Feng, and G.-W. Wei
Journal of Chemical Theory and Computation, **21**(8):4276–4285, (2025)

3. Persistent Directed Flag Laplacian
B. Jones and G.-W. Wei
Foundations of Data Science, **7**(3):737–758, (2025)

2. Bridging Eulerian and Lagrangian Poisson–Boltzmann solvers by ESES
S. Ahmed-Ullah, X. Yang, **B. Jones**, S. Zhao, W. Geng, and G.-W. Wei
Journal of Computational Chemistry, **45**(6):306-320, (2023)

1. Adaptive pseudo-time methods for the Poisson-Boltzmann equation with Eulerian solvent excluded surface
B. Jones, S. Ahmed-Ullah, S. Wang, and S. Zhao
Communications in Information & Systems, **21**(1):85-123, (2021)

Presentations

Invited Talks

JMM MRC Special Session on Climate Science, TDA, and Dynamical Systems	Jan 2025
SIAM MDS Minisymposium on GTDA with Biological Applications	Oct 2024

Contributed Talks

JMM Minisymposium on GTDA with Applications	Jan 2026
University of Missouri Conference on TDA	Nov 2025
Workshop on Computational Persistence (ComPer)	Oct 2025
SIAM Great Lakes Section Annual Meeting	Sept 2025
The Geometric Realization of the AATRN	Aug 2025
Graduate Student Geometry and Topology Conference (GSTGC)	Apr 2025
WinCompTop + AATRN Tutorial-a-thon, YouTube tutorial	Feb 2025
JMM Special Session on TDA: Theory and Applications.	Jan 2025
Workshop on Computational Persistence (ComPer) (virtual)	Sept 2024
Penn State Mathematical Biosciences Workshop	Aug 2024

Seminar Talks

Yale Krishnaswamy Lab Group Meeting	Jan 2026
EPFL Applied Topology Reading Group (virtual)	Nov 2025
MSU TDA Seminar	Apr 2025
MSU Student Geometry and Topology Seminar.	Oct 2024
MSU Operator Algebras Reading Seminar	Mar 2024
UA Applied Math Seminar	Dec 2020

Teaching and Mentoring

MSU MTH 132: Calculus I (TA)	Fall 2025
MSU MTH 299: Transitions (TA)	Spring 2025
MSU MTH 994: Graduate Machine Learning (TA)	Fall 2023
MSU MTH 234: Calculus III (Lecturer)	Summer 2023
MSU MTH 133: Calculus II (TA)	Fall 2022
MSU Teaching Mentor	Spring 2025
MSU Math Graduate Student Peer Mentoring Group	2024-2025
MSU Summer Topology Program (Directed Reading Program) Mentor	Summer 2023
MSU Teaching Mentor	Fall 2022

Awards

MSU Graduate School Travel Fellowship	2025
MSU Council of Graduate Students Conference Award	2025
MSU Sigma Xi Scientific Research Honors Society Full Member	2025
AMS Graduate Student Travel Grant to JMM	2025
MSU G.R.E.A.T. Inclusive Teaching Tips Fellowship	2024
SIAM Student Travel Grant to MDS	2024
MSU College of Natural Sciences Recruiting Fellowship	2021-2022
MSU College of Natural Sciences Early Start Fellowship	2021
UA Randall Outstanding Undergraduate Research Award	2020
UA Phi Beta Kappa	2020
UA Tau Beta Pi Engineering Honors Society	2020
UA Henry Copeland Scholarship	2019
UA Upsilon Pi Epsilon Computer Science Honors Society	2019

Service

SURIEM REU Graduate Student Panel	2025
MSU American Mathematical Society President	2024-2025
MSU Graduate Employees Union Math Department Steward	2023-2025
UA Panel for Accelerated Master's Program	2024
MSU Graduate Employees Union Bargaining Committee	2024
Graduate Student Geometry and Topology Conference Organizing Committee	2024

Professional Experience

NOAA Fisheries, Virtual Student Federal Service Intern, Jan 2021 – Sept 2021
Automated resource allocation for the National Coral Reef Monitoring Program.

U.S. Census Bureau, Computer Science Intern Aug 2020 – Jan 2021
Developed efficient Python software for processing Economic Census data.