Gokul Bhusal

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Education

Michigan State University — *East Lansing, MI*
Doctoral candidate in Applied Mathematics — *August 2020 - May 2026 (Expected)*
Thesis Advisor: Dr. Ekaterina Merkurjev

The University of Southern Mississippi — *Hattiesburg, MS*
B.S. Mathematics & Minor in Computer Science, Magna cum laude — *August 2016 - May 2020*
Advisor: Dr. Zhifu Xie

Research Interests

Graph-based methods, active learning, optimization algorithms, image analysis (hyperspectral).

Publications

- **Gokul Bhusal**, Delanna Do, Kevin Miller, Stephan Wojtowytsch, Ekaterina Merkurjev, Active Learning via Connected Components Sampling (In preparation).
- **Gokul Bhusal**, Delanna Do, Kevin Miller, Stephan Wojtowytsch, Ekaterina Merkurjev, Fast Adaptive Sampling for Graph-Based Coreset Selection (In preparation).
- **Gokul Bhusal**, Yifei Lou, Cristina Garcia-Cardona, Ekaterina Merkurje, A General Framework for Group Sparsity in Hyperspectral Unmixing Using Endmember Bundles. (Submitted).
- **Gokul Bhusal**, Kevin Miller, Ekaterina Merkurjev, MALADY: Multiclass Active Learning with Auction Dynamics on Graphs, *IEEE Transactions on Artificial Intelligence (2025).*
- **Gokul Bhusal**, Ekaterina Merkurjev, Guo-Wei Wei, Persistent Laplacian-enhanced Algorithm for Scarcely Labeled Data Classification, *Machine Learning* 113.10 (2024): 7267-7292.
- Zhifu Xie, **Gokul Bhusal**, Hamas Tahir, Central Configurations in the Planar 6-body Problem Forming Two Equilateral Triangles, *Journal of Geometry and Physics, 153 (2020): 103645.* (Undergraduate paper)

Teaching Experience

- Spring 2025: Teaching Assistant for Mathematics of Machine learning (Math 483), MSU
- Summer 2024: Teaching Assistant for Matrix Algebra with Computational Applications (Math 314), MSU
- Spring 2024: Teaching Assistant for Numerical methods for ODE (Math 852), MSU
  - Qualifying exam course. Hosted weekly qual-prep recitations.
- Fall 2023: Teaching Assistant for Numerical Analysis I (Math 850), MSU
  - Qualifying exam course. Hosted weekly qual-prep recitations.
- Spring 2023: Teaching Assistant for Matrix Algebra with Computational Applications (Math 314), MSU
- Fall 2022: Recitation Instructor for Calculus II (Math 133), MSU
- Summer 2022: Instructor of record for Calculus I (Math 132), MSU
- Spring 2022: Recitation Instructor for Calculus II (Math 133), MSU
- Fall 2021: Recitation Instructor for Calculus II (Math 133), MSU
- Summer 2021: Recitation Instructor for Calculus II (Math 133), MSU

Honors and Awards

2025	Douglas A. Spragg Endowed Fellowship - MSU-Math
2024	Outstanding Scholar Fellowship - College of Natural Science, MSU
2024	TA Award for Excellence in Teaching - Department of Mathematics at MSU
2024	Herbert T.Graham Scholarship - MSU-Math
2023	Outstanding Scholar Fellowship - College of Natural Science, MSU
2020	Early Start Fellowship - College of Natural Science, MSU.
2018	Placed 2nd in the Louisiana/Mississippi region's Mathematical Association of America Research Paper Competition.
2018	Received travel grant for poster presentation at JMM 2018
2018	Nominated for the College of Science and Technology's Outstanding Sophomore Award, USM

Invited Talks/Conference Presentations/Posters

- SIAM Conference on Mathematical and Computational Issues in the Geosciences (GS25), Louisiana, October 14–17, 2025 (talk).
- SIAM Great Lakes Meeting, Illinois Institute of Technology, Sep 27-28, 2025 (poster presentation).
- 14th High Dimensional Data Analysis Workshop (HDDA-XIV), Beaver Island, MI, August 19-22, 2025 (talk).
- SLMath - IBM Research Summer School, IBM, Yorktown, July 17, 2025 (talk).
- SIAM Conference on Mathematics of Data Science (MDS24), Atlanta, October 21–25, 2024 (poster presentation).
- 2024 SIAM Student Mini-Symposium in Applied Mathematics, University of Michigan, Sep 15, 2024(talk).
- SIAM Great Lakes Meeting, Michigan State University, Oct 14, 2023 (talk).
- LA/MS Mathematical Associations of America, Loyola University New Orleans, February 2020 (talk).
- USA/USM/SELU Math and Physics Research Mini-Conference, Gulf Park, MS, April 2019 (talk).
- Undergraduate Symposium on Research and Creative Activity, Hattiesburg, MS, March 2018 (poster presentation).
- Joint Mathematics Meeting San Diego, CA, January 2018 (poster presentation).

Summer school and Workshop attended

- SLMath - IBM Research Summer School: Principled Scientific Discovery with Formal Methods (IBM, Yorktown) July 07-18, 2025
- Workshop: Efficient and Reliable Deep Learning Methods and their Scientific Applications (via Zoom), Banff, Alberta, Canada June 22-27, 2025
- Workshop: AI, Data and PDE Workshop, MSU April 1-3, 2025
- Workshop: Fusing Theory and Practice of Graph Algorithms, ICERM, Feb 20-22, 2025
- Optimal Transport Through the Midwest summer school, University of Wisconsin Madison, July 15-19, 2024.
- 88^{th} Midwest PDE Seminar, The Ohio State University, April 26-28, 2024
- Winter School in Machine Learning 2024, UT-Austin. January 15-19, 2024
  - Mathematics of adversarial machine learning
  - Tensor Methods in Data Science

- Research Experience for Undergraduate (REU) 2019 June 03 - July 19
  School of Mathematics and Natural Sciences, The University of Southern Mississippi, Hattiesburg, MS
  Topic: Allee Effects in a Predator-prey Model with Holling type-IV functional Response.
- Research Experience for Undergraduate (REU) 2017 June 19 - August 4
  School of Mathematics and Natural Sciences, The University of Southern Mississippi, Hattiesburg, MS
  Topic: Stacked Central Configuration for 6-body Problem.

Outreach

- Outreach Volunteer, student poster presentation judge at 2024 AGEP Student Success Conference, MSU, Oct 4, 2024.
- Outreach Volunteer, Marble Elementary School Math Night, November 16, 2023.
- Served as an instructor in the TRIO SSS program (Summer 2022, Summer 2023).

Conference/Seminar Organization

- Co-organizer (with Edem Boahen and Tanvi Mahajan) of Student Applied Mathematics seminar, MSU, Fall 2023 - present.

Relevent Skills

Programming languages	MATLAB, C++, Python.
Libraries/Packages	PyTorch, scikit-learn.
Others	HPCC Environments, LaTeX.

Services and Professional Organization

- **Representative of Math department**, Council of Graduate Students (COGS), Fall 2024– Spring 2025
- **Secretary**, American Math Society, MSU chapter, Fall 2023–Spring 2024
- **Treasurer**, Nepali student Association, Summer 2021–Fall 2022
- **Member**, AMS, Fall 2020 – Present.
- **Member**, SIAM, Fall 2016 – Present.
- **Treasurer** Kappa Mu Epsilon, Fall 2018– Spring 2020

Selected Graduate Coursewrork

- Measure Theory
- Complex Analysis
- Numerical Linear Algebra
- Numerical methods for ODE
- Introduction to PDE (two semesters)
- Mathematics of Data Science
- Topological Data Analysis
- Machine Learning
- Graph Theory
- Deep Learning
- High Dimensional Probability
- Computational Optimization
- Harmonic Analysis
- Sublinear-Time Algorithms and SFTs (Hot Topic Short Course)
- Hamilton–Jacobi Equation
- Numerical methods for Optimal Transport (Hot Topic Short Course)
- Computational Inverse Problem