Xiuyuan Cheng

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E D U C A T I O N

Princeton University　　　　　　　　　　　　　　　　　Princeton, NJ, U.S., 2009-2013
    Ph.D.　Program in Applied and Computational Mathematics
Peking University　　　　　　　　　　　　　　　　　　Beijing, China, 2005-2009
    B.S.　Mathematics

W O R K　E X P E R I E N C E

Duke University　　　　　　　　　　　　　　　　　　　Durham, NC, U.S.
    Associate Professor of Mathematics　　　　　　　　　　2022-present
    Assistant Professor of Mathematics　　　　　　　　　　2017-2022
Yale University　　　　　　　　　　　　　　　　　　　New Haven, CT, U.S.
    Gibbs Assistant Professor of Mathematics　　　　　　　2015-2017
École Normale Supérieure　　　　　　　　　　　　　　Paris, France
    Postdoctoral Researcher　　　　　　　　　　　　　　2013-2015
Princeton University　　　　　　　　　　　　　　　　Princeton, NJ, U.S.
    Research Assistant, Teaching Assistant　　　　　　　　2010-2013

H O N O R S

NSF CAREER Award　　　　　　　　　　　　　　　　　2023
Sloan Research Fellow　　　　　　　　　　　　　　　　2019
Princeton University Harold W. Dodds Fellowship　　　　　2012
Princeton University C.V. Starr Fellowship　　　　　　　　2009

P U B L I C A T I O N S

Journal Publications

1. X. Cheng and Y. Xie. "Kernel two-sample tests for manifold data." Accepted to *Bernoulli Journal*.
2. R. Qu, X. Cheng, E. Sefik, J.S. Stanley, B. Landa, F. Strino, S. Platt, J. Garritano, I. Odell, R. Coifman, R.A. Flavell, P. Myung, Y. Kluger. "Gene trajectory inference for single-cell data by optimal transport metrics." *Nature Biotechnology* (2024).
3. E. Rosen, P. Hoyos, X. Cheng, J. Kileel, Y. Shkolnisky. "The G-invariant graph Laplacian Part I: Convergence rate and eigendecomposition." *Applied and Computational Harmonic Analysis* (2024).
4. C. Xu, J. Lee, X. Cheng, Y. Xie. "Flow-based Distributionally Robust Optimization." *IEEE Journal on Selected Areas in Information Theory* (JSAIT) (2024).
5. M. Repasky, X. Cheng, and Y. Xie. "Neural Stein critics with staged L2-regularization." *IEEE Transactions on Information Theory* (2023).
6. B. Landa and X. Cheng. "Robust inference of manifold density and geometry by doubly stochastic scaling." *SIAM Journal on Mathematics of Data Science* (SIMODS) (2023).
7. C. Xu, X. Cheng, and Y. Xie. "Invertible neural networks for graph prediction." *IEEE Journal on Selected Areas in Information Theory* (JSAIT) (2022).
8. X. Cheng and N. Wu. "Eigen-convergence of Gaussian kernelized graph Laplacian by manifold heat interpolation." *Applied and Computational Harmonic Analysis*, 61, 132-190 (2022).
9. Y. Tan, Y. Zhang, X. Cheng, and X.-H. Zhou. "Statistical inference using GLEaM model with spatial heterogeneity and correlation between regions." *Scientific Reports*, 12:16630 (2022).
10. X. Cheng and A. Cloninger. "Classification logit two-sample testing by neural networks for differentiating near manifold densities." *IEEE Transactions on Information Theory*, 68(10), 6631-6662 (2022). (Original name: "Classification logit two-sample testing by neural networks", arXiv: 1909.11298.)
11. W. Zhu, Q. Qiu, R. Calderbank, G. Sapiro, and X. Cheng. "Scaling-translation-equivariant networks with decomposed convolutional filters." *Journal of Machine Learning Research*, 23, 1-45 (2022).
12. X. Cheng and H.-T. Wu. "Convergence of graph Laplacian with kNN self-tuned kernels." *Information and Inference: A Journal of the IMA* (2021).
13. J. Zhao, A. Jaffe, H. Li, O. Lindenbaum, E. Sefik, R. Jackson, X. Cheng, R. Flavell, and Y. Kluger. "Detection of differentially abundant cell subpopulations in scRNA-seq data." *Proceedings of the National Academy of Sciences*, 118, no. 22 (2021).

14. Y. Li, X. Cheng, and J. Lu, "Butterfly-net: optimal function representation based on convolutional neural networks." *Communications in Computational Physics*, 28, 1838-1885 (2020).

15. H. N. Mhaskar, A. Cloninger, and X. Cheng. "A witness function based construction of discriminative models using Hermite polynomials." *Frontiers in Applied Mathematics and Statistics*, section Mathematics of Computation and Data Science (2020).

16. X. Cheng and G. Mishne. "Spectral embedding norm: looking deep into the spectrum of the graph Laplacian." *SIAM Journal on Imaging Sciences*, 13(2), 1015-1048 (2020).

17. R. Alaifari, X. Cheng, L. B. Pierce, and S. Steinerberger. "On matrix rearrangement inequalities." *Proceedings of the AMS*, 148(5), 1835-1848 (2020).

18. X. Cheng, A. Cloninger, and R. R. Coifman. "Two-sample statistics based on anisotropic kernels." *Information and Inference: A Journal of the IMA* (2019).

19. X. Cheng, M. Rachh, and S. Steinerberger. "On the diffusion geometry of graph Laplacians and applications." *Applied and Computational Harmonic Analysis*, 46(3), 674-688 (2019).

20. X. Cheng, G. Mishne, and S. Steinerberger. "The geometry of nodal sets and outlier detection." *Journal of Number Theory*, 185, 48-64 (2017).

21. J. Lu, Y. Lu, X. Wang, X. Li, G.C. Linderman, C. Wu, X. Cheng, L. Mu, H. Zhang, J. Liu, M. Su, H. Zhao, E.S. Spatz, J.A. Spertus, F.A. Masoudi, H.M. Krumholz, and L. Jiang. "Prevalence, awareness, treatment, and control of hypertension in China: data from 1.7 million adults in a population-based screening study (China PEACE Million Persons Project)." *The Lancet*, 390(10112), 2549-2558 (2017).

22. X. Cheng, X. Chen, and S. Mallat. "Deep Haar scattering networks." *Information and Inference: A Journal of the IMA*, 5(2), 105-133 (2016).

23. T. Zhang, X. Cheng, and A. Singer. "Marchenko-Pastur law for Tyler's M-estimators." *Journal of Multivariate Analysis*, 149, 114-123 (2016).

24. G. Pragier, I. Greenberg, X. Cheng, and Y. Shkolnisky. "A graph partitioning approach to simultaneous angular reconstitution." *IEEE Transactions on Computational Imaging* (2016).

25. N. Boumal and X. Cheng. "Concentration of the Kirchhoff index for Erdos-Rényi graphs." *System and Control Letters*, 74, 74-80 (2014).

26. X. Cheng and A. Singer. "The spectrum of high-dimensional random inner-product matrices." *Random Matrices: Theory and Applications*, 02, 04 (2013).

27. W. E, X. Zhou and X. Cheng. "Sub-critical bifurcation in spatially extended systems." *Nonlinearity*, 25, 761 (2012).

28. L. Lin, X. Cheng, W. E, A.C. Shi, and P. Zhang. "A numerical method for the study of nucleation of ordered phases." *Journal of Computational Physics*, 229, 1797 (2010).

29. X. Cheng, L. Lin, W. E, P. Zhang, and A.C. Shi. "Nucleation of ordered phases in block copolymers." *Physical Review Letters*, 104, 148301 (2010).

Conference Publications

1. M. Repasky, X. Cheng, Y. Xie. "Stage-regularized neural Stein critics for testing Goodness-of-fit of generative models" *2024 IEEE International Conference on Acoustics, Speech and Signal Processing* (ICASSP 2024).

2. C. Xu, X. Cheng, and Y. Xie. "Normalizing flow neural networks by JKO scheme." *The 37th Conference on Neural Information Processing Systems* (NeurIPS 2023) (spotlight).

3. Z. Dong, X. Cheng, and Y. Xie. "Spatio-temporal point processes with deep non-stationary kernels." *The 11th International Conference on Learning Representations* (ICLR 2023).

4. J. Lee, Y. Xie, and X. Cheng. "Training neural networks for sequential change-point detection." *2023 IEEE International Conference on Acoustics, Speech and Signal Processing* (ICASSP 2023).

5. Z. Chen, Y. Li, and X. Cheng. "SpecNet2: Orthogonalization-free spectral embedding by neural networks." *The Third Mathematical and Scientific Machine Learning Conference* (MSML 2022).

6. S. Zhu, H. Wang, Z. Dong, X. Cheng, and Y. Xie. "Neural spectral marked point processes." *The 10th International Conference on Learning Representations* (ICLR 2022).

7. X. Cheng and Y. Xie. "Neural tangent kernel maximum mean discrepancy." *The 35th Conference on Neural Information Processing Systems* (NeurIPS 2021).

8. Z. Miao, Z. Wang, X. Cheng, and Q. Qiu. "Spatiotemporal joint filter decomposition in 3D convolutional neural networks." *The 35th Conference on Neural Information Processing Systems* (NeurIPS 2021).

9. X. Cheng, Z. Miao, and Q. Qiu. "Graph convolution with low-rank learnable local filters." *International Conference on Learning Representations* (ICLR 2021) (spotlight).

10. Y. Zhang, X. Cheng, G. Reeves. "Convergence of Gaussian-smoothed optimal transport distance with sub-gamma distributions and dependent samples." *24th International Conference on Artificial Intelligence and Statistics* (AISTATS 2021).

11. Z. Wang, X. Cheng, G. Sapiro, and Q. Qiu. "A dictionary approach to domain-invariant learning in deep networks." *34th Conference on Neural Information Processing Systems* (NeurIPS 2020).
12. H. Li, O. Lindenbaum, X. Cheng, and A. Cloninger. "Variational diffusion autoencoders with random walk sampling." *2020 European Conference on Computer Vision* (ECCV 2020).
13. Z. Xu, Y. Li, and X. Cheng. "Butterfly-net2: simplified Butterfly-net and Fourier transform initialization." *Mathematical and Scientific Machine Learning Conference* (MSML 2020).
14. Z. Wang, X. Cheng, G. Sapiro, and Q. Qiu. "Stochastic conditional generative networks with basis decomposition." *International Conference on Learning Representations* (ICLR 2020).
15. X. Cheng, Q. Qiu, R. Calderbank, G. Sapiro. "RotDCF: Decomposition of convolutional filters for rotation-equivariant deep networks." *International Conference on Learning Representations* (ICLR 2019).
16. Q. Qiu, X. Cheng, R. Calderbank, G. Sapiro. "DCFNet: Deep neural network with decomposed convolutional filters." *Proceedings of the 35rd International Conference on Machine Learning* (ICML 2018).
17. B. Yan, P. Sarkar and X. Cheng. "Provable estimation of the number of blocks in block models." *Proceedings of the International Conference on Artificial Intelligence and Statistics* (AISTATS 2018).
18. U. Shaham, X. Cheng, O. Dror, A. Jaffe, B. Nadler, J. Chang and Y. Kluger. "A deep learning approach to unsupervised ensemble learning." *The 33rd International Conference on Machine Learning* (ICML 2016).
19. X. Chen, X. Cheng and S. Mallat. "Unsupervised deep Haar scattering on graphs." *Advances in Neural Information Processing Systems 27* (NIPS 2014).

PREPRINTS

1. X. Cheng, J. Lu, Y. Tan, Y. Xie. "Convergence of flow-based generative models via proximal gradient descent in Wasserstein space." arXiv: 2310.17582.
2. E. Rosen, X. Cheng, Y. Shkolnisky, "G-invariant diffusion maps", arXiv: 2306.07350.
3. Z. Dong, M. Repasky, X. Cheng, and Y. Xie. "Deep graph kernel point processes." arXiv: 2306.11313.
4. Y. Tan, L. Xie, and X. Cheng. "Neural differential Recurrent Neural Network with adaptive time steps." arXiv: 2306.01674.
5. C. Xu, X. Cheng, and Y. Xie. "Computing high-dimensional optimal transport by flow neural networks." arXiv: 2305.11857.
6. X. Cheng and B. Landa. "Bi-stochastically normalized graph Laplacian: convergence to manifold Laplacian and robustness to outlier noise." arXiv: 2206.11386.
7. C. Xu, X. Cheng, and Y. Xie. "Training neural networks using monotone variational inequality." arXiv: 2202.08876.
8. Wang, X. Cheng, G. Sapiro, and Q. Qiu. "ACDC: Weight sharing in atom-coefficient decomposed convolution." arXiv: 2009.02386.
9. U. Shaham, J. Garritano, Y. Yamada, E. Weinberger, A. Cloninger, X. Cheng, K. Stanton, and Y. Kluger. "Defending against adversarial images using basis functions transformations." arXiv: 1803.10840.

RESEARCH FUNDING

NSF DMS-2237842   2023-2028
CAREER: Learning of graph diffusion and transport from high dimensional data with low-dimensional structures.
Role: PI

NSF DMS-2134037   2022-2024
SCALE MoDL: Bridging Statistical Hypothesis Tests and Deep Learning for Reliability and Computational Efficiency.
Role: Co-PI

NSF DMS-2007040   2020-2025
NSF-BSF: Group Invariant Graph Laplacians: Theory and Computations. Role: PI

NIH No. R01GM131642   2019-2023
Efficient Methods for Calibration, Clustering, Visualization and Imputation of Large scRNA-seq Data. Role: Co-I

NSF DMS-1820827   2018-2022
CDS&E: Structure-aware Representation Learning using Deep Networks. Role: PI

NSF DMS-1818945   2018-2022
Collaborative Research: Geometric Analysis and Computation of Generative Models. Role: PI

Foundation Sciences Mathématiques de Paris Postdoc Fellow   2013-2014

PROFESSIONAL SERVICES

Conference Organization

BIRS workshop on "Computational Harmonic Analysis in Data Science and Machine Learning"
Casa Matemática Oaxaca, Mexico, September 2024
Co-organized with Thomas Strohmer (UC Davis), Amit Singer (Princeton), Soledad Villar (JHU)

SIAM-MDS 22 Mini symposium on "Geometry of Data: From Manifolds to Graphs"   San Diego, CA, September 2022
    Co-organized with Boris Landa (Yale), Gal Mishne (UCSD)
The ICLR 2021 Workshop on "Geometric and Topological Representation Learning"   (Virtual) May, 2021
    Co-organized with Smita Krishnaswamy (Yale), Jure Leskovec (Stanford), Bastian Rieck (ETH Zurich), Soledad
    Villar (JHU), Guy Wolf (U Montreal)
Program Committee Member of the conference on Mathematical and Scientific Machine Learning (MSML) 2020, 2021
    Meta-reviewer in MSML20   (Virtual) July, 2020
    Meta-reviewer, chair the "Inverse Problems" Session in MSML21   (Virtual) August, 2021
Program Leader of SAMSI Program on Deep Learning   Durham, NC, Fall 2019
42nd SIAM Southeastern Atlantic Sectional Conference (SIAM-SEAS 2018)   Chapel Hill, NC, March 2018
    Co-organized with Jianfeng Lu (Duke), Alina Chertock & Mansoor Haider (NCState), Greg Forest & Katie Newhall
    (UNC Chapel Hill)
SIAM 16 mini-Symposium on "Computational Methods for Cryo-EM Single Particle Reconstruction"
    Co-organized with Zhizhen Zhao (UIUC)   Albuquerque, NM, May 2016

Guest Editor

Research in the Mathematical Sciences (RMS) Special Issue: PDE methods for machine learning

Refereeing

Journals: Bernoulli, Annuals of Statistics, Applied and Computational Harmonic Analysis, SIAM Journal on Imaging
    Sciences, Inverse Problems, IEEE Transaction on Signal Processing, Probability Theory and Related Fields, Journal of
    Fourier Analysis and Applications, SIAM Journal on Mathematics of Data Science.
Conferences: NeurIPS, ICML, ICLR, ICCV, CVPR, AAAI.
NSF Panel.

PRESENTATIONS

Conference and Workshop Presentations

Tutorial on "Deep generative model for inference" at 2024 IEEE International Conference on Acoustics, Speech and
Signal Processing (ICASSP 2024). Given jointly with Yao Xie (GT)   Seoul, Korea, April 2024
AMS Southeastern Sectional Meeting 2024 Spring, Invited talk in "Special Session on Mathematical Advances in
Scientific Machine Learning"   Tallahassee, FL, March 2024
37th Conference on Neural Information Processing Systems (NeurIPS 2023) Poster   New Orleans, LA, December 2023
International Conference on Learning Representations (ICLR 2023) Poster presentation   (Virtual) May 2023
2023 Information Theory and Applications Workshop (ITA 2023)   San Diego, CA, February 2023
Conference on the Mathematical Theory of Deep Neural Networks (DeepMath 2022) Poster presentation
                                                      San Diego, CA, November 2022
SIAM-MDS 22 Mini symposium on "Geometric Distances and Robust Data Analysis"   San Diego, CA, September 2022
Plenary talk "Decomposed Convolutional Deep Networks: on Graphs, Groups, and Across Domains". Triangle
Computational and Applied Mathematics Symposium.   Raleigh, NC, September 2022
Algorithms for Threat Detection (ATD2022) and Second "Graph Theoretical Methods for Blockchain Data Analysis"
Workshop   Fairfax, VA, May 2022
International Conference on Learning Representations (ICLR 2022) Poster presentation   (Virtual) April 2022
SIAM-PD22 Mini symposium on "The Geometry of PDEs on Graphs: Analysis and Applications" (Virtual) March 2022
35th Conference on Neural Information Processing Systems (NeurIPS 2021) Poster   (Virtual) December 2021
Conference on the Mathematical Theory of Deep Neural Networks (DeepMath 2021) Poster presentation
                                                        (Virtual) November 2021
NCM21: New Connections in Math 2021(RTG undergrad research weekend)   Durham, NC, October 2021
International Conference on Learning Representations (ICLR 2021) Spotlight Oral presentation   (Virtual) May 2021
34th Conference on Neural Information Processing Systems (NeurIPS 2020) Poster   (Virtual) December 2020
International Conference on Learning Representations (ICLR 2020) Poster   (Virtual) April 2020
AIM Workshop on "Deep learning and partial differential equations"   San Jose, CA, October 2019
BIRS (Banff International Research Station) workshop on "Computational Harmonic Analysis and Data Science"
                                                      Oaxaca, Mexico, October 2019
SAMSI 2019 Fall Program on Deep Learning: Opening Workshop   Durham, NC, August 2019
9th International Congress on Industrial and Applied Mathematics (ICIAM 2019)   Valencia, Spain, July 2019
SIAM Conference on Applied Algebraic Geometry (SIAM AG 2019)   Bern, Switzerland, July 2019
International Conference on Learning Representations (ICLR 2019)   New Orleans, LA, May 2019
International Conference on Machine Learning 35 (ICML 2018)   Stockholm, Sweden, July 2018

International Conference on Machine Learning 33 (ICML 2016)	New York City, NY, June 2016
SIAM Conference on Imaging Science	Albuquerque, NM, May 2016
Neural Information Processing Systems 27 (NIPS '14)	Montreal, Canada, December 2014
UCL-Duke Workshop on Sensing and Analysis of High-Dimensional Data	London, U.K., September 2014
APS (American Physical Society) March Meeting 2012	Boston, MA, March 2012

Invited Seminar Talks

One World-MINDS Seminar	(Virtual) May, 2024
ML Center Seminar Series, *Georgia Tech*	Atlanta, GA, April 2024
Wharton Statistics Seminar, *UPenn*	Philadelphia, PA, November 2023
Department of Mathematics Colloquium, *U Michigan, Ann Arbor*	Ann Arbor, MI, September 2023
Mathematics of Data & Decision Seminar, *UC Davis*	(Virtual) May 2023
Level Set Seminar at Mathematics Department, *UCLA*	(Virtual) May 2023
Department of Statistics CAM Colloquium, *University of Chicago*	Chicago, IL, March 2023
Applied Mathematics Seminar, *Technion*	Haifa, Israel, January 2023
Department of Applied Mathematics, *Tel Aviv University*	Tel-Aviv, Israel, December 2022
Applied Mathematics Seminar, *Yale University*	New Haven, CT, November 2022
UNC Department of Statistics Colloquium, *UNC Chapel Hill*	Chapel Hill, NC, October 2022
Workshop on "High throughput approach to energy materials", *Georgia Tech*	Atlanta, GA, April 2022
RTG working seminar, *Duke University*	Durham, NC, January 2022
Applied Mathematics Seminar, *Yale University*	(Virtual) November 2011
ACM Seminar, Department of Mathematics, *National University of Singapore*	(Virtual) March 2021
Department Colloquium, School of Mathematics, *Peking University*, China	(Virtual) January 2021
IMA Data Science Seminar, IMA, *University of Minnesota*	(Virtual) December 2020
Data Science Seminar, *Purdue University*	(Virtual) November 2020
Applied Math and Data Science Seminar, *RPI*	(Virtual) October, 2020
Colloquium Series of Applied Mathematics and Computational Science, *UPenn*	Philadelphia, PA, December 2019
Applied Mathematics Seminar, *Yale University*	New Haven, CT, May 2019
Department of Mathematics, *UC Berkeley*	Berkeley, CA, December 2018
Department of Mathematics, *Georgia Tech*	Atlanta, GA, April 2018
Department of Mathematics, *UC San Diego*	San Diego, CA, February 2017
Department of Mathematics, *UC Davis*	Davis, CA, February 2017
Department of Mathematics, *Duke University*	Durham, NC, September 2016
Institute for Mathematics and its Applications (IMA), *University of Minnesota*	Minneapolis, MN, September 2016
Department of Mathematics, *California Institute of Technology*	Pasadena, CA, May 2016
Department of Mathematics, *The University of Texas at Austin*	Austin, TX, April 2016
Courant Institute Probability Seminar, *New York University*	New York City, NY 2012
Wilks Statistics Seminar, *Princeton University*	Princeton, NJ, 2012
Ergodic Theory & Statistical Mechanics Seminar, *Princeton University*	Princeton, NJ, 2012

STUDENT MENTORING

Graduate student mentoring:
- Yixuan Tan (5th year Ph.D. student, Math), Thesis Advisor
- Langxuan Su (Ph.D. student, Math, till 2023), mentor of 1st year Ph.D. study

Exam and Thesis committee:
- Yixin Tan (Ph.D. student, Math, till 2024), member of dissertation committee
- Ziang Chen (Ph.D. student, Math, till 2023), member of dissertation committee
- Tao Tang (Ph.D. student, Math, till 2023), member of dissertation committee
- Zibu Liu (Ph.D. student, Math, till 2023), member of oral qualify exam committee
- Mo Zhou (Ph.D. student, Math, till 2023), member of dissertation committee
- Mingyuan Zheng (Ph.D. student, Chemistry, till 2023), member of dissertation committee
- Kevin Stubbs (Ph.D. student, Computer Science, till 2021), member of dissertation committee
- Tianyu Wang (Ph.D. student, Computer Science, till 2021), member of dissertation committee
- Zhe Wang (Ph.D. student, Math, till 2020), member of dissertation committee
- Ze Wang (Ph.D. student, ECE, till 2020 with Master's degree), member of Master's degree exam committee
- Jieren Xu (Ph.D. student, Math, till 2018), member of dissertation committee

Undergraduate research mentoring:
- Brian Lee, Flora Shi, Nick Talati. Duke Math DoMath 2022 project.
  Project title: Spatial-temporal prediction on graphs by recurrent neural network.
- Bhrij Patel. Duke Math DoMath 2020 and independent study project.
  Project title: Neural network dimension reduction of data with topological constraint.
- Remy Kassem (current Math Ph.D. student in Columbia University). Duke Math PRUV 2019 and Senior Thesis.
  Project title: Symmetry detection of unknown volumes from projected observations.
- Runliang (Oscar) Li (current Ph.D. student in CMU). Independent study project in 2019.
  Project title: Structured bases-learning convolutional neural networks.
- Tyler Lian, Inchan Hwang, Joseph Saldutti and Ajay Dheeraj. Duke Math DoMath 2018 project.
  Project title: Local affinity construction for dimension reduction methods.
- Austin Wang (Yale undergraduate till 2017). Senior Thesis project in 2017 (mentored at Yale).
  Project title: Analysis of the learning process of a recurrent neural network on the last k-bit parity function.

Postdoc mentoring:
- Jiajia Yu (ARP, Math)

Informal mentoring of/working with postdocs:
- Ziyu Chen (former ARP, currently Visiting AP at UMass)
- Nan Wu (former ARP, currently AP at UT Dallas)
- Yimin Zhong (former ARP, currently AP at Auburn University)
- Wei Zhu (former ARP, currently AP at UMass)
- Yingzhou Li (former ARP, currently AP at Fudan University, China)

COURSE DEVELOPMENT

Courses taught at Duke:
- Math 631 Measure and Integration, Fall 2018, 2023.
- Math 465 Introduction to High Dimensional Data Analysis, Fall 2023.
- Math 532 Basic Analysis II (undergraduate), Spring 2022, 2020, 2019, 2018, 2024.
- Math 790 Minicourse: An introduction to kernel methods in machine learning, Fall 2021.
- Math 302 Numerical Analysis (undergraduate, Duke Kunshan University), Spring 2021.
- Math 405 Methods in Data Analysis (undergraduate, Duke Kunshan University), Spring 2021.
- Math 122L Introductory Calculus II (faculty mentor of 1st-year undergraduate calculus course), Fall 2019.
- Math 466 Mathematics of Machine Learning (undergraduate course jointly taught by cross-department faculty instructors), Fall 2019.
- Math 561 Numerical Linear Algebra, Fall 2019.
- Math 790 Minicourse: High dimensional probability in data analysis, Fall 2018
- Math 690 Topics in Data Analysis and Computation, Fall 2017.

Courses taught at Yale:
- Math 705 Topics in Machine Learning Theory and Computation (graduate student seminar), Spring 2016, 2017.
- Math 260 Basic Analysis in Function Spaces, Fall 2016.
- Math 225 Linear Algebra and Matrix Theory, Fall 2015.