

CHENYU ZHANG

Email: zcysxy@mit.edu

Homepage: zcysxy.github.io

EDUCATION

Massachusetts Institute of Technology

Ph.D. Social and Engineering Systems and Statistics
Presidential Fellow (Sole recipient in cohort)

Cambridge, MA

2024 - present

Columbia University

M.S. Data Science

New York, NY

2022 - 2024

Fudan University

B.S. Mathematics and Applied Mathematics
Honors Student of Su Buqing Top Talent Program

Shanghai, China

2018 - 2022

PUBLICATIONS

- [1] **Chenyu Zhang** and Navid Azizan. Personalized collaborative learning with affinity-based variance reduction. *Preprint. Under review*, 2026.
- [2] **Chenyu Zhang** and Rujun Jiang. Riemannian adaptive regularized Newton methods with Hölder continuous Hessians. *Computational Optimization and Applications*, 2025.
- [3] **Chenyu Zhang**, Xu Chen, and Xuan Di. Stochastic semi-gradient descent for learning mean field games with population-aware function approximation. *International Conference on Learning Representations (ICLR)*, 2025.
- [4] **Chenyu Zhang**, Rufeng Xiao, Wen Huang, and Rujun Jiang. Riemannian trust region methods for SC^1 minimization. *Journal of Scientific Computing*, 2024.
- [5] Fuzhong Zhou, **Chenyu Zhang**, Xu Chen, and Xuan Di. Graphon mean field games with a representative player: analysis and learning algorithms. *International Conference on Machine Learning (ICML)*, 2024.
- [6] **Chenyu Zhang**, Han Wang, Aritra Mitra, and James Anderson. Finite-time analysis of on-policy heterogeneous federated reinforcement learning. *International Conference on Learning Representations (ICLR)*, 2024.
- [7] **Chenyu Zhang**, Xu Chen, and Xuan Di. A single online agent can efficiently learn mean field games. *European Conference on Artificial Intelligence (ECAI)*, 2024.

RESEARCH EXPERIENCE

Multi-Activity Network Games

February 2025 - Present

Ph.D. student, advised by Prof. **Saurabh Amin** LIDS, Massachusetts Institute of Technology, MA

- Integrated sustainability constraints into targeted interventions for multi-activity network games.
- Developed graphon modeling of cross-activity interaction to simplify analysis of large activity networks.

Personalized Collaborative Learning [1]

September 2024 - Present

Ph.D. student, advised by Prof. **Navid Azizan** LIDS, Massachusetts Institute of Technology, MA

- Designed the first multi-agent learning framework that enables collaboration between arbitrarily heterogeneous agents and yields fully personalized solutions with an adaptive, affinity-based speedup.

Neural Networks

May 2023 - December 2023

Research assistant, advised by Prof. **John Wright** Dept. EE&APAM, Columbia University, NY

- Analyzed the limitations of Transformers and designed tailored attention mechanisms using tensor kernels and invariant similarity weights.

- Conducted a comprehensive empirical study to estimate the intrinsic dimension of patch manifolds, deriving the optimal patch size for various vision tasks.

Mean Field Games [3,5,7]

Research assistant, advised by Prof. **Sharon Di**

May 2023 - August 2024

Dept. CEEM, Columbia University, NY

- Pioneered the first fully online single-agent model-free methods for learning mean field games (MFGs), achieving sample efficiency and stability enhancements without auxiliary mechanisms.
- Extended these methods to linear MFGs with continuous state-action spaces and graphon MFGs with large heterogeneous populations.

Federated Reinforcement Learning [6]

Research assistant, advised by Prof. **James Anderson**

September 2022 - December 2023

Co-advised by Prof. **Aritra Mitra**

Dept. ECE, North Carolina State University, NC

- Developed a novel on-policy federated reinforcement learning method and established its finite-time error bounds, demonstrating linear convergence speedup despite the presence of environmental heterogeneity.

Nonsmooth Nonconvex Manifold Optimization [2,4]

Research assistant, advised by Prof. **Rujun Jiang**

October 2021 - September 2022

Co-advised by Prof. **Wen Huang**

Dept. Mathematics, Xiamen University, CN

- Developed the first Riemannian trust-region method tailored for minimizing nonconvex functions on manifolds with a semismooth gradient field, supported by rigorous global and local convergence analysis.
- Implemented the semismooth Riemannian trust-region method in solving augmented Lagrangian method subproblems on manifolds, demonstrating its superiority through two numerical experiments.
- Extended the methodology to formulate a Riemannian adaptive regularized Newton methods framework and established its sharp worst-case iteration and operation complexities.

Reinforcement Learning with Partial Observability

March 2021 - January 2022

Research assistant, advised by Prof. **Zhaoran Wang** *Dept. of IEMS&CS, Northwestern University, IL*
Co-advised by Prof. **Zhuoran Yang** *Dept. of Stat&Data Science, Yale University, CT*

- Devised an innovative exploration mechanism to handle partial observability without reward feedback.
- Enhanced the mechanism by integrating linear function approximation, enabling its application to large and potentially infinite observation and state spaces.

TEACHING EXPERIENCE

15/6/IDS.C57 Optimization Methods

Teaching assistant, with Prof. Alexandre Jacquillat and Prof. Saurabh Amin

Fall 2025

MIT Sloan, MA

6.431x Probability

Teaching assistant, with Prof. John Tsitsiklis and Prof. Patrick Jaillet

Summer 2025

Dept. EECS, MIT, MA

18.6501x Fundamentals of Statistics

Teaching assistant, with Prof. Philippe Rigollet

Summer 2025

Dept. Mathematics, MIT, MA

COMS 4771 Machine Learning

Teaching assistant, with Prof. Daniel Hsu

Fall 2023

Dept. CS, Columbia University, NY

ORCS 4529 Reinforcement Learning

Teaching assistant, with Prof. Shipra Agrawal

Fall 2023

Dept. IEOR, Columbia University, NY

EEOR 4650 Convex Optimization

Teaching assistant, with Prof. James Anderson

Fall 2023

Dept. EE, Columbia University, NY

CSOR 4231 Analysis of Algorithms

Teaching assistant, with Prof. Eleni Drinea

Spring 2023

Dept. CS, Columbia University, NY

RELEVANT COURSEWORK

Selected Graduate Courses

Modern Mathematical Statistics*	A	Modern Control Theory*	A+
Machine Learning	A	Reinforcement Learning*	A+
High-Dimensional Probability*	A	Probability and Statistics for Data Science	A+
Algorithms for Data Science	A+	Exploratory Data Analysis	A+

Selected Undergraduate Courses

Numerical Linear Algebra and Optimization†	A	Deep Learning	A
Numerical Solution to Differential Equations	A	Methods of Optimization	A
Numerical Analysis	A-	Probability Theory	A
An Introduction to Differential Manifolds†	A-	Advanced Algebra	A
Complex Analysis	A	Fundamentals of Mechanics	A

Selected Seminars

Matrix Analysis	Convex Optimization
Heuristic Optimization Algorithms	Complex Analysis
Advanced Mathematical Analysis	Principles of Mathematical Analysis
Global Differential Geometry	Differential Manifolds and Differential Topology
Differential Geometry of Curves and Surfaces	Non-Euclidean Geometry and Point Set Topology

SCHOLARSHIP & AWARD

- Presidential Fellowship, Massachusetts Institute of Technology 2024
- Honors Student of Top Talent Program, Fudan University 2022
- Undergraduate Merit Scholarship, Fudan University 2018-2019, 2019-2020, 2020-2021, 2021-2022
- Undergraduate Major Scholarship, Fudan University 2019-2020, 2020-2021, 2021-2022
- Freshman Scholarship, Fudan University 2018

TECHNICAL SKILLS

Languages

Python, JavaScript, MATLAB, R, Lua, Shell

Frameworks & Libraries

PyTorch, TensorFlow, NumPy, scikit-learn, pandas, Keras, Flask

Tools

Git, Linux, Docker, Google Cloud Platform, Weights & Biases

SERVICE

Journal Reviewer

- IMA Journal of Numerical Analysis 2025
- IEEE Transactions on Signal Processing 2025
- IEEE Transactions on Control of Network Systems 2025

Conference Reviewer

- International Conference on Learning Representations (ICLR) 2025, 2026
- International Conference on Artificial Intelligence and Statistics (AISTATS) 2025, 2026
- AAAI Conference on Artificial Intelligence (AAAI) 2026
- Conference on Neural Information Processing Systems (NeurIPS) 2024, 2025
- International Conference on Machine Learning (ICML) 2025
- IEEE Conference on Decision and Control (CDC) 2025
- Learning for Dynamics & Control Conference (L4DC) 2024

*Doctoral level courses

†Honors courses