Emily Ryu

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https://emilyryu.github.io

Education

2021–Present	**Ph.D.**, Computer Science, Cornell University *Advisors: Éva Tardos & Jon Kleinberg* Research interests: algorithmic game theory, market/mechanism design, learning theory, combinatorial optimization GPA: 4.05/4.00
2017–21	**A.B.**, Chemistry, Princeton University Certificates: Applied & Computational Mathematics, Applications of Computing, Materials Science & Engineering GPA: 3.98/4.00

Research Experience

Jul–Sep 2025	**Toyota Technical Institute at Chicago** *Advisors: Avrim Blum & Jingyan Wang* Modeled optimal persuasive recommendation policies for school choice with Bayesian students.
Jun 2025	**University of Pennsylvania**, Department of Computer & Information Science *Advisors: Aaron Roth & Michael Kearns* Analyzed information aggregation in networked environments using machine learning frameworks; formulated a game-theoretic model of strategic competition extending Bayesian persuasion to multi-round conversations.
Jun 2021–Present	**Cornell University**, Department of Computer Science *Advisors: Éva Tardos & Jon Kleinberg* Algorithmic and computational modeling of behavioral and cognitive biases in economic structures, including school choice and recommendation systems.
May 2020–Present	**Princeton University**, Department of Computer Science *Advisor: Matt Weinberg* Study revenue-optimal Bayesian multi-item, multi-bidder auctions via a duality-based framework. Senior thesis: *Bounding the Competition Complexity via Dual Flows, Discretizations, and Symmetries* (recipient of Applied and Computational Mathematics Independent Project Prize)
Sep 2018–May 2021	**Princeton University**, Department of Chemistry *Advisor: Robert Knowles* Developed novel photoredox catalytic method for heterocyclic olefin hydroamination; modeled thermodynamic properties using density functional theory. Senior thesis: *Intramolecular Benzimidazole Hydroamination Enabled by Proton-Coupled Electron Transfer*

Publications and Papers   G Google Scholar

Conference Publications

C1. Kearns, M., Roth, A. & Ryu, E. *Networked Information Aggregation via Machine Learning* in *Proceedings of the 2026 ACM-SIAM Symposium on Discrete Algorithms (SODA)* To appear (2026). arXiv: 2507.09683 [cs.LG]. https://arxiv.org/abs/2507.09683.

C2. Derakhshan, M., **Ryu, E.**, Weinberg, S. M. & Xue, E. *Settling the Competition Complexity of Additive Buyers over Independent Items* in *Proceedings of the 25th ACM Conference on Economics and Computation* (2024), 420–446.

C3. Kleinberg, J., Oren, S., **Ryu, E.** & Tardos, É. *Modeling reputation-based behavioral biases in school choice* in *Proceedings of the 25th ACM Conference on Economics and Computation* (2024), 671–672.

C4. Kleinberg, J., **Ryu, E.** & Tardos, É. *Calibrated Recommendations for Users with Decaying Attention* in *Algorithmic Game Theory* (eds Schäfer, G. & Ventre, C.) (Springer Nature Switzerland, Cham, 2024), 443–460. ɪsʙɴ: 978-3-031-71033-9.

Journal Articles

J1. **Ryu, E.**, Xia, H. H., Guo, G. L. & Zhang, L. Multivariable-adjusted trends in mortality due to alcoholic liver disease among adults in the United States, from 1999-2017. *Am. J. Transl. Res.* **14,** 1092–1099 (Feb. 2022).

Preprints

P1. Collina, N., Goel, S., Roth, A., **Ryu, E.** & Shi, M. *Emergent Alignment via Competition* Accepted at NeurIPS 2025 Workshop on Algorithmic Collective Action and Workshop on Multi-Turn Interactions in Large Language Models; under submission to ICLR 2026. 2025. arXiv: 2509.15090 [cs.LG]. https://arxiv.org/abs/2509.15090.

Working Papers

W1. Peng, K., **Ryu, E.**, Kleinberg, J., Tardos, É. & Garg, N. *Undermatching in New York City School Choice: Application Behavior and the Value of Personalized Feedback* 2025.

Presentations

Invited Talks

Modeling Reputation-Based Behavioral Biases in School Choice, INFORMS Annual Meeting, *invited session on Responsible Decision Making with Discrete Optimization*, Oct 2025 (upcoming).

Behavioral Bias in School Choice: Theory and Empirics, Cornell University Theory Seminar, Dec 2024.

Posters

Deviations from Reach Match Safety Strategies Explain Undermatching Disparities in New York City High Schools (Marketplace Innovation Workshop 2025)

Modeling Reputation-Based Behavioral Biases in School Choice (WALE 2024, EC Gender Inclusion Workshop 2024)

Calibrated Recommendations for Users with Decaying Attention (EC Gender Inclusion Workshop 2023, WINE 2022)

Awards & Honors

2023	NSF Graduate Research Fellowship
2021	Induction into Phi Beta Kappa Society and Sigma Xi Research Society
2021	Applied and Computational Mathematics Independent Project Prize
2021	Robert T. McCay Prize, *awarded for best performance on comprehensive physical chemistry exam*
2020	William Foster Memorial Prize in Chemistry, *awarded to one junior in department for outstanding academic, research, and leadership ability*
2018, 2019	Shapiro Prize for Academic Excellence, *awarded to top 2-3% of class for range, depth, and difficulty of academic program*

Teaching

Cornell University

2024	**Teaching Assistant**, CS 6850: The Structure of Information Networks
2021	**Teaching Assistant**, CS 2850: Networks

Princeton University

2021	**Course Grader**, COS 445: Economics & Computation
2021	**Teaching Assistant**, ORF 309: Probability & Stochastic Systems
2019, 2020	**Teaching Assistant**, CHM 304: Organic Chemistry II

Academic Service

Program Committee Reviewer: EC 2025, WWW 2025, WWW 2026

Journal Reviewer: *IEEE Transactions on Network Science and Engineering* (2024)

Student Reader, Cornell University CS PhD Admissions (2024, 2025)

Mentoring

2023, 2025	**Undergraduate Research Mentor**
	Guided two undergraduate students through independent research projects, from literature review and project design to final implementation and analysis.
2023–2025	**Cornell CS PhD Mentoring Program**
	Mentored 1-2 incoming PhD students annually to facilitate their academic and social transition into the department.
2021–Present	**Cornell CS Student-Applicant Support Program**
	Provide application advice and feedback to prospective PhD applicants from marginalized and underrepresented backgrounds.

Leadership & Outreach

2022–Present	**Co-organizer**, Cornell CS Theory Tea
	Co-organize weekly student-run theory seminar to foster research discussion and community.
2022–Present	**Workshop Designer & Leader**, Expanding Your Horizons at Cornell
	Designed and led a hands-on workshop introducing computer science and networking concepts to middle- and high-school students at education outreach conference.
2019–21	**Residential College Advisor**, Princeton University
	Managed a residence hall of 20-30 undergraduate students, providing academic and personal advising and building an inclusive community.
2018–19	**Assistant Coordinator**, Princeton University Mathematics Competition
	Organized logistics for a major interscholastic competition, including participant registration, speaker coordination, and event management.
2017–19	**Dance Instructor**, CityStep Princeton
	Taught weekly dance outreach classes to students at underserved public elementary schools in Trenton, NJ.

Professional Experience

May–Aug 2021	**Valkyrie Trading**, Derivatives Trader Intern
	Developed algorithms to identify mispricings in the options trading market; used in combination with volatility modeling to generate positive expectancy portfolio suggestions.
Jun–Aug 2020	**Five Rings Capital**, Quantitative Trading Intern
	Researched cross-symbol market microstructural patterns to develop and backtest trading signals.

Skills

Technical: Python, Java, R
Language: Spanish (conversational proficiency)

Last updated: October 6, 2025