Emily Ryu

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Education

Cornell University — Ithaca, NY
Ph.D. in Computer Science — 2021–Present

- Advisers: Profs. Éva Tardos & Jon Kleinberg
- GPA: 4.05/4.00
- Coursework includes: Analysis of Algorithms, The Structure of Information Networks, Engineering Societal Systems, Data Science for Social Change, Mathematical Programming, Advanced Operating Systems

Princeton University — Princeton, NJ
Bachelor of Arts in Chemistry — 2017–2021

- Certificates: Applied & Computational Mathematics, Applications of Computing, Materials Science & Engineering
- Overall GPA: 3.98/4.00
- Coursework includes: Advanced Algorithm Design, Probability Theory, Economics & Computing, Combinatorics, Applied Algebra

Research Experience

- Theory Group, Cornell University Department of Computer Science — June 2021–Present
  Advisers: Profs. Éva Tardos & Jon Kleinberg
  - Research interests: algorithmic game theory, mechanism design, market design, combinatorial optimization
- Princeton University Department of Computer Science — May 2020–Present
  Adviser: Prof. Matthew 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)
- Knowles Group, Princeton University Department of Chemistry — September 2018–May 2021
  Adviser: Prof. Robert Knowles
  - Developed novel photoredox catalytic method for heterocyclic olefin hydroamination (formation of functionally useful carbon-nitrogen bonds); modeled thermodynamic properties of method using density functional theory.
  - Senior thesis: *Intramolecular Benzimidazole Hydroamination Enabled by Proton-Coupled Electron Transfer*

Publications and Papers

[1] M. Derakhshan, **E.** Ryu, S. M. Weinberg, and E. Xue, "Settling the competition complexity of additive buyers over independent items", *arXiv preprint arXiv:2403.03937*, 2024.

[2] J. Kleinberg, S. Oren, **E.** Ryu, and É. Tardos, "Modeling reputation-based behavioral biases in school choice", *arXiv preprint arXiv:2403.04616*, 2024.

[3] J. Kleinberg, **E.** Ryu, and É. Tardos, *Calibrated recommendations for users with decaying attention*, (incorporates and supersedes earlier paper on ordered submodularity), 2023. arXiv: 2302.03239 [cs.DS].

[4] **E.** Ryu, H. H. Xia, G. L. Guo, and L. Zhang, "Multivariable-adjusted trends in mortality due to alcoholic liver disease among adults in the united states, from 1999-2017", *Am. J. Transl. Res.*, vol. 14, no. 2, pp. 1092–1099, Feb. 2022.

Awards and Honors

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

Teaching Experience

- **Cornell University** (graduate)
  CS 6850: The Structure of Information Networks, *Teaching Assistant* — Fall 2024
  CS 2850: Networks, *Teaching Assistant* — Fall 2021
- **Princeton University** (undergraduate)
  COS 445: Economics & Computation, *Course Grader* — Spring 2021
  ORF 309: Probability & Stochastic Systems, *Teaching Assistant* — Spring 2021
  CHM 304: Organic Chemistry II, *Teaching Assistant* — Spring 2019 & 2020

Professional Experience

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

Service & Leadership

- **Cornell CS PhD Mentoring Program** — Fall 2023–Present
  Mentor 1-2 incoming PhD students to help them acclimate to the department academically and socially.
- **Cornell CS Theory Tea** — Fall 2022–Present
  Co-organize weekly student-run theory seminar to facilitate research discussion and socialization.
- **Expanding Your Horizons at Cornell** — Spring 2022-2024
  Designed and led a hands-on workshop introducing middle- and high-school girls to computer science topics at education outreach conference.
- **Cornell CS Student-Applicant Support Program** — Fall 2021-2023
  Provided prospective PhD applicants from marginalized backgrounds with application advice and feedback on their personal statements.
- **Residential College Adviser** — August 2019–May 2021
  Managed a Princeton University residence hall of 20-30 undergraduate students; advised students on academic and personal needs; foster development of a diverse and inclusive community.
- **Princeton University Mathematics Competition**, Assistant Coordinator — October 2018–November 2019
  Organized participant registration, host/student matching, guest speaker, and day-of-contest logistics.
- **CityStep Princeton** — September 2017–December 2019

Taught weekly dance outreach classes to students at underserved public elementary schools in Trenton, NJ.

Skills

Technical: Python, Java, R

Language: Spanish (conversational proficiency)