Saumya Sinha **Curriculum Vitae**

CONTACT INFORMATION

Dept. of Industrial & Systems Engineering
University of Minnesota
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INTERESTS

Optimization under uncertainty, sequential decision-making, healthcare operations, personalized medicine, clinical decision-making.

CURRENT AFFILIATION

Assistant Professor, Industrial & Systems Engineering, University of Minnesota-Twin Cities, Minneapolis, MN Since Aug 2022

PAST EMPLOYMENT

Postdoctoral Research Associate, Computational Applied Mathematics & Operations Research, Rice University, Houston TX Oct 2018-Aug 2022

Visiting Postdoctoral Fellow, Department of Surgery, Houston Methodist Hospital, Houston TX Jul 2019-Jun 2022

EDUCATION

PhD, Applied Mathematics (Advanced Data Science option) August 2018
University of Washington, Seattle WA
Dissertation: Robust dynamic optimization: theory and applications
Advisor: Archis Ghate

MS, Applied Mathematics March 2015
University of Washington, Seattle WA

MS, Mathematics July 2013
TIFR Centre for Applicable Mathematics, Bangalore, India

BS (Honors), Mathematics June 2011
St. Stephen's College, University of Delhi, India

PUBLICATIONS & PREPRINTS

6. On the strength of Lagrangian duality for multiobjective integer programming (M. Brun*, T. Perini, **S. Sinha**, A.J. Schaefer) *Mathematical Programming*, forthcoming. (Winner, INFORMS Undergraduate Operations Research Prize, 2022)
5. Markov Decision Process Design: A Framework for Integrating Strategic and Operational Decisions (S. Brown**, **S. Sinha**, A.J. Schaefer) *Operations Research Letters*, 2024.
4. Relaxations and duality for multiobjective integer programming (A. Dunbar*, **S. Sinha**, A.J. Schaefer) *Mathematical Programming*, 2023.
(Finalist for the INFORMS Undergraduate Operations Research Prize, 2020)
3. Characterizing rational transplant program response to outcome-based regulation (D. Mildebrath**, T. Lee, **S. Sinha**, A.J. Schaefer, A.O. Gaber) *Operations Research*, 2023.

*, † respectively denote an undergraduate and masters student I supervised, ** denotes a graduate student in my postdoc research group

2. Policy iteration for robust nonstationary Markov decision processes (**S. Sinha**, A. Ghate) *Optimization Letters*, 2016.
1. Robust response-guided dosing (**S. Sinha**, J. Kotas, A. Ghate) *Operations Research Letters*, 2016.

WORKING PAPERS

5. Approximate policy iteration for robust countable-state Markov decision processes (**S. Sinha**, A. Ghate)
4. A robust multi-period Newsvendor model with inventory balance constraints (**S. Sinha**, M.R. Wagner, A. Ghate)
3. Incentives in outcome-based regulation for solid organ transplantation (D. Mildebrath**, **S. Sinha**, T. Lee, A.J. Schaefer, H.J. Huang, A.O. Gaber)
2. Duality for countably infinite integer programs (**S. Sinha**, R. Schellenberger*, S. Hosseinian, A.J. Schaefer)
1. Value iteration for infinite-horizon risk-sensitive Markov decision processes (D. Zhang*, **S. Sinha**, M. Hemmati, A.J. Schaefer)

TEACHING EXPERIENCE

University of Minnesota
- Statistics, Quality and Reliability (IE 3521) - *Spring 2024*
- Healthcare Analytics (Topics course, IE 5080) - *Fall 2023*
- Simulation (IE 3553/5553) - *Fall 2023, 2024*
- Senior Design (IE 4041) - *Spring 2023* (co-instructor)

Rice University
- Instructor, Stochastic processes and simulation (INDE 572) - *Spring 2022*
- Guest Lecturer, Applied discrete optimization (INDE 597) - *Spring 2019*

University of Washington

Instructor:
- Applied linear algebra & numerical analysis - *Summer 2018* & *Summer 2017*
- Introduction to differential equations and applications - *Spring 2018*
- Partial differential equations and waves - *Spring 2017*

Teaching Assistant:
- Vector calculus and complex variables - *Fall 2017* & *Fall 2015*
- Computational methods for data analysis - *Winter 2017*
- Methods for partial differential equations - *Spring 2016*
- Introduction to continuous mathematical modeling - *Summer* & *Winter 2015*
- Applied linear algebra and numerical analysis - *Summer 2015*
- Introduction to differential equations and applications - *Summer 2015*
- Advanced methods for partial differential equations - *Spring 2015*
- Algebra with applications - *Fall* & *Winter 2014*
- Calculus with analytic geometry II - *Fall 2013*

RESEARCH MENTORSHIP

University of Minnesota
- Ting-Tsen Lin, PhD student in ISyE (since Spring 2024)
- Michael Olabode, PhD student in ISyE (since Fall 2023)
- Ruiqi Wang†, MS Statistics (since Fall 2022)

Rice University
- Daihan (Jack) Zhang: Value iteration for infinite-horizon risk-sensitive Markov decision processes (since Spring 2022)
- Matthew Brun: Lagrangian duality for multiobjective IPs (Fall 2021-Spring 2022)
- Robert Schellenberger: Duality for countably infinite IPs (Spring 2020-Spring 2022)
- Alex Dunbar: Relaxations and duality for multiobjective IPs (Fall 2018-Summer 2020)

UNDERGRADUATE ADVISING

University of Minnesota
- Senior design project (5 students): Spring 2024
  Topic: Chemotherapy patients selection algorithm for home infusion, sponsored by Mayo Clinic.
- Wenshu Gao: April-August 2023
- Senior design project (5 students): Spring 2023
  Topic: Decreasing hospital tube stockouts and optimizing system performance at the University of Minnesota Medical Center

Rice University
- Stormi Allen-Knight: Discrete-event simulation for lung transplantation (REU Data Science, Summer 2022)
- Oren Pazgal: Simulation for transplant patient selection (Summer 2019)
- Carlos Linares: Simulation in Python (Summer 2019)

University of Washington
- Yusha Wang (Spring 2018)
  Graduate mentor for the 'Women in Applied Math Mentorship' Program. *Topic:* Choice modeling and its application to airline network management

PROFESSIONAL SERVICE & OUTREACH

Peer-review for journals
- Annals of Operations Research
- Discrete Optimization
- INFORMS Journal on Computing
- Operations Research
- Operations Research Forum
- Optimization Letters
- Production and Operations Management

Officer for the INFORMS Forum for Women in OR & Management Sciences (WORMS)
- Secretary, 2020 and Vice-President of Communications, 2021 & 2022

Conference organization
- Member, Local organizing committee, Mixed Integer Programming Workshop 2024

Session Chair at conferences
- A panel discussion on healthcare research funding, INFORMS Annual Meeting 2024 *(planned)*
- Discrete Optimization with Multiple Objectives, INFORMS Optimization Society Conference 2024
- Incentive Design and Game Theory in Healthcare, INFORMS Annual Meeting 2023
- Policy Design in Healthcare, INFORMS Annual Meeting 2022

- OR Methods for Health Policy Design, INFORMS Annual Meeting 2021
- Robust and Dynamic Stochastic Optimization, INFORMS Annual Meeting 2018
- Statistics- and Information-based Approaches to Stochastic Optimization, INFORMS Annual Meeting 2017

Co-organizer of the ISyE Department Seminar – since Fall 2023

Summer outreach at the University of Minnesota
- Instructor for Discover STEM 2023 and Eureka 2024 *(planned)*

Mentor
- INFORMS Mentorship Program – since 2024
- WORMS Mentorship Program – 2018, and since 2021
- 'Women in Applied Math Mentorship' Program, University of Washington, 2018

Guest Speaker at the AWM Abstract Math Summer Program for non male-identifying high-school students at Rice University, July 2022

Panelist on a 'Careers in Mathematics' panel for undergraduate students in mathematical sciences, Rice University, December 2020

Volunteer for multiple community outreach events – conducted math-based games and activities for K-12 students, served as judge for student competitions.
- Science and Engineering Fair of Houston, *February 2020 & 2021*
- Math Olympiad, Seattle, *May 2016*
- Math Moves, Pacific Science Center, Seattle, *March 2016*
- Mathcounts, *February 2015*
- Math Hour Olympiad, *June 2014* & *June 2015*
- Julia Robinson Math Festival, *March 2014* & *April 2015*
- University of Washington Math Fair, *March 2014* & *December 2013*

Co-organizer, Student Seminar Series at TIFR-CAM, 2012-2013
Coordinated weekly campus talks on math-related topics by graduate students.

AWARDS & RECOGNITION

- 'Rising Stars in Computational & Data Sciences' Workshop, University of Texas, Austin, 2020
- INFORMS Doctoral Student Colloquium, 2017
- William and Marilyn Conner Endowed Fellowship, University of Washington, 2014
- INSPIRE Scholarship, Department of Science & Technology, Government of India, 2008
- National Talent Search Scholarship, National Council for Educational Research & Training, India, 2006

PRESENTATIONS

- INFORMS Annual Meeting, October 2024, Seattle *(planned)*
- International Symposium on Mathematical Programming, July 2024, Montreal *(planned)*
- INFORMS Optimization Society Conference, March 2024, Houston
- Data Science Symposium, South Dakota State University, February 2024, Brookings
- A Conference on Women in Pure and Applied Mathematics, SRM University-AP, January 2024, Amaravathi, India

- INFORMS Annual Meeting, October 2023, Phoenix
- INFORMS Healthcare Conference, July 2023, Toronto
- Mixed-integer Programming Workshop, May 2023, Los Angeles
- Graduate student seminar, Industrial & Systems Engineering, University of Minnesota, November 2022
- Texas A&M University, AMS Student Chapter Seminar, November 2022
- INFORMS Annual Meeting, October 2022, Indianapolis
- Indian Institute of Science Education and Research, Bhopal, India, March 2022
- Virginia Tech, February 2022
- Beedie School of Business, Simon Fraser University, February 2022
- University of Minnesota, February 2022
- Ohio State University, January 2022
- Colorado School of Mines, January 2022
- Indian Institute of Management, Bangalore, India, December 2021
- Tippie College of Business, University of Iowa, December 2021
- Indian School of Business, December 2021
- INFORMS Annual Meeting, October 2021, Anaheim
- INFORMS Annual Meeting, November 2020 (Virtual)
- Rising Stars 2020, October 2020 (Virtual)
- INFORMS Annual Meeting, November 2018, Phoenix
- INFORMS Annual Meeting, October 2017, Houston
- Applied Mathematics Seminar, December 2017, University of Washington, Seattle
- INFORMS Applied Probability Society Conference, July 2017, Evanston
- SIAM Conference on Optimization, May 2017, Vancouver, Canada
- INFORMS Annual Meeting, November 2015, Philadelphia

WORKSHOPS & VISITS

- Mixed-integer Programming Workshop at University of Southern California, Los Angeles - May 2023
- Rising Stars 2020 at University of Texas, Austin - October 2020 (virtual)
- Industrial Mathematics Worksop at Institute for Mathematics and its Applications, Minneapolis - July 2017
- Visiting student at International Centre for Theoretical Sciences, India - September 2016
  Studied theoretical and numerical aspects of matrix completion problems.
- Statistical & Applied Mathematical Sciences Institute (SAMSI) Optimization Summer School - August 2016
- Software Carpentry Workshop at University of Washington - January 2015

PROFESSIONAL MEMBERSHIPS

- Institute for Operations Research & Management Sciences (INFORMS)
- INFORMS Health Applications Society
- INFORMS Optimization Society
- INFORMS Forum for Women in OR/MS (WORMS)

Last updated on July 30, 2024.