Saumya Sinha — Curriculum Vitae

CONTACT INFORMATION

Dept. of Industrial & Systems Engineering
University of Minnesota
207 Church Street SE
Minneapolis, MN 55455

Office: Lind Hall 240D
Email: saumya@umn.edu
Website: saumya-sinha.github.io

INTERESTS

Optimization under uncertainty, sequential decision-making, robust optimization, healthcare operations, clinical decision-making, health policy.

CURRENT AFFILIATION

Assistant Professor, Industrial & Systems Engineering, University of Minnesota, 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

3. Characterizing rational transplant program response to outcome-based regulation (D. Mildebrath**, T. Lee, **S. Sinha**, A.J. Schaefer, A.O. Gaber) To appear in *Operations Research.*
2. Policy iteration for robust nonstationary Markov decision processes (**S. Sinha**, A. Ghate) *Optimization Letters*, Vol 10(8), 1613-1628 2016.
1. Robust response-guided dosing (**S. Sinha**, J. Kotas, A. Ghate) *Operations Research Letters*, Vol 44(3), 394-399 2016.

** denotes a graduate student in my postdoc research group

SUBMITTED / UNDER REVIEW

3. Approximate policy iteration for robust countable-state Markov decision processes (**S. Sinha**, A. Ghate) Submitted to *SIAM Journal on Control and Optimization.*
2. On the strength of Lagrangian duality for multiobjective integer programming (M. Brun*, T. Perini, **S. Sinha**, A.J. Schaefer) Submitted to *Mathematical Programming.*
   (Winner, INFORMS Undergraduate Operations Research Prize, 2022)
1. Relaxations and duality for multiobjective integer programming (A. Dunbar*, **S. Sinha**, A.J. Schaefer) Under second review at *Mathematical Programming.* Available on Optimization Online
   (Finalist for the INFORMS Undergraduate Operations Research Prize, 2020)

WORKING PAPERS

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

TEACHING EXPERIENCE

University of Minnesota
- Co-instructor, Senior Design (IE 4041) - *Spring 2023*

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*

*, † respectively denote an undergraduate and masters student I supervised.

- 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
- Ruiqi Wang[†] (since Fall 2023)

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 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
- INFORMS Journal on Computing
- Production and Operations Management
- Operations Research Forum
- Optimization Letters

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

Session Chair at INFORMS Annual Meetings
- Policy Design in Healthcare, Indianapolis 2022
- OR Methods for Health Policy Design, Anaheim 2021
- Robust and Dynamic Stochastic Optimization, Phoenix 2018
- Statistics- and Information-based Approaches to Stochastic Optimization, Houston 2017

Mentor
- WORMS Mentorship Program – 2018, 2021, 2022
- '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

INVITED TALKS

- INFORMS Healthcare Conference, July 2023, Toronto (planned)
- Mixed-integer Programming Workshop, May 2023, Los Angeles (planned)
- 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 (planned)*
- 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 Forum for Women in OR/MS (WORMS)
- Society for Industrial & Applied Mathematics (SIAM)

Last updated on February 16, 2023.