Saumya Sinha **Curriculum Vitae**

CONTACT INFORMATION

University of Minnesota-Twin Cities
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RESEARCH INTERESTS

Optimization under uncertainty, sequential decision-making, robust optimization, incentive design, healthcare operations and policy, inventory management.

CURRENT AFFILIATION

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

PAST EMPLOYMENT

Postdoctoral Research Associate October 2018 - August 2022
Computational Applied Mathematics & Operations Research, Rice University, Houston TX
Worked with Andrew Schaefer on multiobjective, stochastic, and dynamic optimization problems, with a focus on organ transplantation and other healthcare applications.

Visiting Postdoctoral Fellow July 2019 - June 2022
Department of Surgery, Houston Methodist Hospital, Houston TX
Used operations research (OR) and analytics for risk-benefit assessment of organ transplant patients, and studying strategic implications of the same.

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

5. Relaxations and duality for multiobjective integer programming (A. Dunbar**, **S. Sinha**, A.J. Schaefer) *Under first revision for Mathematical Programming.*
   Finalist for the INFORMS Undergraduate Operations Research Prize, 2020
4. Approximate policy iteration for robust countable-state Markov decision processes (**S. Sinha**, A. Ghate) *Under major revision for Operations Research.*
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.

WORKING PAPERS

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 (R. Schellenberger**, **S. Sinha**, A.J. Schaefer)

* denotes a graduate student in my postdoc research group, and ** denotes an undergraduate student I supervised.

1. On the strength of Lagrangian duality for multiobjective integer programming (M. Brun**, T. Perini, **S. Sinha**, A.J. Schaefer)

TEACHING EXPERIENCE

Instructor, Rice University, Houston.
- Stochastic processes and simulation (INDE 572) - *Spring 2022*

Guest Lecturer, Rice University, Houston.
- Applied discrete optimization (INDE 597) - *Spring 2019*

Instructor, University of Washington, Seattle.
- Applied linear algebra and numerical analysis - *Summer 2018* & *Summer 2017*
- Introduction to differential equations and applications - *Spring 2018*
- Partial differential equations and waves - *Spring 2017*

Teaching Assistant, University of Washington, Seattle.
- 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

Student supervision, Rice University, Houston — Since November 2018

Supervising undergraduate students on individual research projects.
- Stormi Allen-Knight: Discrete-event simulation for single versus bilateral lung transplantation (REU Data Science, Summer 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)
- Oren Pazgal: Simulation for transplant patient selection (Summer 2019)
- Carlos Linares: Simulation in Python (Summer 2019)

Graduate mentor, University of Washington, Seattle — Spring 2018

Supervised an undergraduate student for the 'Women in Applied Math Mentorship' Program. *Topic:* Choice modeling and its application to airline network management

Undergraduate Research Mentor, TIFR CAM, Bangalore, India — May 2013

Supervised 20 undergraduate students in a Summer research program; assisted with designing models for optimal town-planning using network structure.

PROFESSIONAL SERVICE & OUTREACH

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 (planned)
- 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 and 2021
- 'Women in Applied Math Mentorship' Program, University of Washington, 2018

Guest Speaker at the AWM Abstract Math Summer Program 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

- Rational transplant program response to outcome-based regulation in lung transplantation
  Indian School of Business, December 2021
  Tippie College of Business, University of Iowa, December 2021
  Indian Institute of Management, Bangalore, India, December 2021
  Colorado School of Mines, January 2022
  Ohio State University, January 2022
  University of Minnesota, February 2022
  Beedie School of Business, Simon Fraser University, February 2022
  Virginia Tech, February 2022
  Indian Institute of Science Education and Research, Bhopal, India, March 2022
- Incentives in outcome-based regulation for solid organ transplantation
  INFORMS Annual Meeting, October 2021, Anaheim INFORMS Annual Meeting, October 2022, Indianapolis (planned)
- Relaxation and duality for multiobjective integer programming
  INFORMS Annual Meeting, November 2020 (Virtual)
- Patient Selection for lung transplantation: a transplant program perspective
  Rising Stars 2020, October 2020 (Virtual)
- Robust countable-state Markov decision processes
  INFORMS Annual Meeting, November 2018, Phoenix
  INFORMS Annual Meeting, October 2017, Houston

INFORMS Applied Probability Society Conference, July 2017, Evanston
SIAM Conference on Optimization, May 2017, Vancouver, Canada

- A robust multi-period Newsvendor model with inventory balance constraints
  INFORMS Annual Meeting, November 2018, Phoenix
  Applied Mathematics Seminar, December 2017, University of Washington, Seattle
- Policy iteration for robust nonstationary Markov decision processes
  INFORMS Annual Meeting, November 2015, Philadelphia

WORKSHOPS & VISITS

- 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 Forum for Women in OR/MS (WORMS)
- Society for Industrial & Applied Mathematics (SIAM)

SELECTED COURSEWORK

- Linear Programming & Game Theory
- Optimization in System Sciences
- Mathematical Programming
- Integer Programming
- Network Optimization
- Introduction to Data Science
- Computational Methods for Data Analysis
- Machine Learning
- Econometrics
- Data Visualization

SELECTED COURSE PROJECTS

- Mapping dengue vulnerability in Peru, *Data Visualization, Spring 2018*
- Airline revenue management using mixed-integer programming, *Integer Programming, Winter 2017*
- Binary classification using Stochastic Dual Coordinate Ascent, *Machine Learning, Fall 2016*
- Influence of food access and poverty on obesity, *Introduction to Data Science, Fall 2015*

Last updated on September 1, 2022.