

Tyler Perini

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Rice University \diamond 6100 Main MS-134 Houston, TX 77005

POSITIONS

Rice University, Houston

July 2021-Present

Computational Mathematics and Operations Research Department

Pfeiffer Postdoctoral Instructor, working with Andrew J. Schaefer

EDUCATION

Georgia Institute of Technology, Atlanta

2021

H. Milton Stewart School of Industrial and Systems Engineering

Ph.D. in Operations Research, supported by NSF GRFP, advisor Natasha Boland

College of Charleston, Charleston

2016

B.S. in Applied Mathematics, Minor in Linguistics, Honors College, 3.9 GPA

DISSERTATION

Techniques for Multiobjective Optimization with Discrete Variables: Boxed Line Method and Tchebychev Weight Set Decomposition. ([link](#))

Committee: Natasha Boland (advisor), M. Savelsbergh, S. Dey, P. Van Hentenryck, A. Langville

RESEARCH INTERESTS

Algorithms for Multiobjective Optimization

Advancing methodologies for multiobjective (mixed) integer linear programs, including dimension-reduction approaches such as criterion space search and weight space decomposition

Healthcare Applications

Data analysis and visualization models for transmission and/or intervention, such as agent-based methods for Guinea Worm, data visualization for COVID-19 and cancer radiotherapy

Duality Theory for Discrete Optimization

Exploring various forms of duality for multiobjective integer programs with a focus on practical computation and local/global sensitivity analysis

PUBLICATIONS

Refereed journal articles:

2020 An agent-based simulation for Guinea worm infections in dogs.

The American Journal of Tropical Medicine and Hygiene. 103(5): 1942.

T. Perini, J. Swann, P. Keskinocak, E. Ruiz-Tiben, and Z. Li.

2020 A criterion space method for biobjective mixed integer programming: the boxed line method.

INFORMS Journal on Computing. 32:1, pgs. 16-39.

T. Perini, N. Boland, D. Pecin, and M. Savelsbergh.

2019 A data-driven support strategy for a sustainable research software repository.

Concurrency Computational Practical Experience. 31:20.

M. Belgin, **T. Perini**, F. Liu, N. Zhang, S. Sarajlic, A. McNeill, P. Manno, and N.C. Bright.

Manuscripts submitted:

- 2022** Weighted Tchebycheff weight set decomposition for multiobjective discrete optimization.
Journal of Global Optimizaiton - Accepted July 2022.
S. Helfrich, **T. Perini**, P. Halfmann, N. Boland, and S. Ruzika.
- 2022** Weight set decomposition for rank aggregation: interpretable and visual decision support tool.
AMS Journal on Foundations of Data Science. (preprint)
T. Perini, A. Langville, G. Kramer, J. Shrager, M. Shapiro.
- 2020** Book chapter: A survey of progress in algorithms for multiobjective MIP.
Handbook on Multi-objective Combinatorial Optimization, by M. Ehrgott et. al.
N. Boland, B. Soylyu, and **T. Perini**.

Manuscripts in preparation:

- 2022** On the strength of Lagrangian duality in multiobjective integer programming.
Finalist for INFORMS Undergraduate Operations Research Prize.
M. Brun*, **T. Perini**, S. Sinha, A. J. Schaefer. *Rice undergraduate, PhD student at MIT.
- 2022** Evaluating the effectiveness of potential intervention methods for Guinea worm disease in dogs.
The American Journal of Tropical Medicine and Hygiene.
Y. Wang, **T. Perini**, P. Keskinocak, H. Smalley, and J. Swann.
- 2022** Computing Tchebychev weight space decomposition for multiobjective discrete optimization.
(preprint)
T. Perini, S. Helfrich, P. Halfmann, N. Boland, and S. Ruzika.
- 2022** A fast and robust algorithm for solving biobjective mixed integer programs.
(preprint)
I. Herszterg, **T. Perini**, D. Pecin, N. Boland, and M. Savelsbergh.
- 2022** On the structure of inverse multiobjective integer programs.
D. Qiu*, **T. Perini**, S. Valeva, A. J. Schaefer. (*then-undergraduate, now Masters student)
- 2022** We're here: interviews with LGBTQ members of the INFORMS community.
T. Perini.

Self-published educational materials:

- 2021** Deconstruct this Calculus 1 Journal: Derivatives.
Self-published via *Vervante Press*. **Website** and **Amazon link**.
A. Langville, **T. Perini**.

TEACHING EXPERIENCE

- F22** Instructor for *Real Analysis* (Rice: CAAM 501).
9 first-year PhD students. In progress.
- F21-S22** Instructor for *Intro to OR and Optimization* (Rice: CAAM 378).
30+ students each semester. Piloted miniprojects.
“One of the most interactive and engaging courses I’ve ever taken at Rice.”
- S22** Faculty Colloquy on Critical Reflective Pedagogy.
Rice University Center for Teaching Excellence.

- S21** Graduate Student Instructor for *Engineering Optimization* (GT: ISYE 3133).
2 sections of 30 students each. Virtual, synchronous.
Student Recognition of Excellence in Teaching: Spring 2021 CIOS Honor Roll.
- 2021** Tech to Teaching Certification + Associate Level Certification.
Georgia Institute of Technology Center for Integration of Research, Teaching, & Learning.
- 2016** Teaching Assistant for Probability with Applications (GT: ISYE 2027).

PRIZES, FELLOWSHIPS, AWARDS

- 2022** Mentor and Coauthor for Matthew Brun, Finalist for Undergraduate Operations Research Prize
INFORMS
- 2020** INFORMS DEI Ambassador for *We're here: interviews with LGBTQ community*
INFORMS
- 2020** ICS Student paper prize for *A criterion space method for biobjective mixed integer programming*
INFORMS Computing Society
- 2019** Graduate Research Opportunities Worldwide for an international research collaboration
National Science Foundation
- 2017** Graduate Research Fellowship Program
National Science Foundation
- 2016** Presidential Fellowship
Georgia Tech H. Milton Stewart School of Industrial and Systems Engineering

CONFERENCE ACTIVITY

Upcoming Talks:

- 2022** Neural networks for complete sensitivity analysis of combinatorial optimization problems
INFORMS Annual Meeting Monday Oct. 17, 11am, Session MB70
T. Perini, M. C. Camur, J. Huchette, A. J. Schaefer.
- 2022** A Benders decomposition approach for solving the majority-minority districting problem
INFORMS Annual Meeting Sunday Oct. 16, 2pm, Session SD71
S. Kroger, H. Validi, **T. Perini**, I. V. Hicks.

Sessions Organized:

- 2019** Simulation models in healthcare.
INFORMS Annual Meeting.
T. Perini, P. Keskinocak, and J. Swann.

Research Presentations:

- 2022** Neural networks for complete sensitivity analysis of combinatorial optimization problems.
INFORMS Annual Meeting.
T. Perini, M. C. Camur, J. Huchette, A. J. Schaefer.
- 2020** A Weight set decomposition algorithm for the weighted Tchebycheff scalarization.
Recent Advances in Multiobjective Optimization.
T. Perini, S. Helfrich, P. Halffman, and N. Boland.

- 2019** Enhanced algorithms for mixed integer biobjective optimization.
INFORMS Computing Society Conference.
T. Perini, I. Herszterg, D. Pecin, N. Boland, and M. Savelsbergh.
- 2019** An agent-based simulation for Guinea worm infections in dogs.
Institute of Industrial and Systems Engineers (IISE) Annual Expo.
T. Perini, P. Keskinocak, and J. Swann.
- 2018** Approximation of the frontier for a BOMILP: Comparing methods.
International Symposium on Mathematical Programming.
T. Perini, D. Pecin, N. Boland, and M. Savelsbergh.
- 2017** The boxed line algorithm for mixed integer biobjective optimization.
International Federation of Operations Research Societies.
T. Perini, N. Boland, M. Savelsbergh, and D. Pecin.

Non-Research Talks:

- 2022** Active learning in the STEM classroom using the deconstruct pedagogy.
Teaching, Learning, and Technology Conference.
A. Langville, K. Pedings-Behling, **T. Perini.**
- 2021** We're here: interviews with LGBTQ members of the INFORMS community.
INFORMS Annual Meeting. Part of the INFORMS DEI Ambassador Program.
T. Perini.
- 2021** Put on your hard hat: let's deconstruct calculus!
MAA Virtual Programming. Two-part webinar with 50+ attendees.
T. Chartier, A. Langville, K. Pedings-Behling, **T. Perini.**
- 2021** Multiobjective problem solving: when, why, and how?
LivePerson. Brown-bag talk for a company that utilizes conversational AI.
T. Perini.

STUDENT MENTORSHIP

* indicates students from underrepresented minority groups

NSF GRFP Application Mentorship

- **2021:** C. Anderson*, M. Brun, J. Forner

Undergraduate Research Mentorship

- **2021:** L. Kuhlman*, J. Yaffee, M. Brun, C. Tolbert
- **2022:** N. Patnaik*, D. Qiu

GRANT WRITING EXPERIENCE

Actively involved in

- **2022:** *Disrupting Opioid Distribution through Strategic Wastewater Monitoring.* NSF D-ISN. PI: A. J. Schaefer.
- **2022:** Administrative Supplement for the NCI to "Support Enhancement of Software Tools for Open Science", Parent Grant *SCH: Personalized Rescheduling of Adaptive Radiation Therapy for Head and Neck Cancer.* PI: A. J. Schaefer. Co-Is: **T. Perini**, R. Myers. Submitted to NSF/NCI.

PROFESSIONAL SERVICE

Referee for

European Journal of Operational Research, SIAM Journal on Optimization, INFORMS Journal on Computing, Mathematical Programming Computation

REFERENCES

1. Andrew Schaefer. Rice University. Postdoc advisor; Noah Harding Chair and Professor. `andrew.schaefer@rice.edu`
2. Natasha Boland. (Retired from) Georgia Institute of Technology. PhD advisor; Fouts Family Professor. `natashia.boland@gmail.com` or by phone +61-474-872-819 (daytime hours in Australian Western Standard Time)
3. Pinar Keskinocak. Georgia Institute of Technology. 2020 INFORMS president; William W. George Chair and Professor, ISyE; ADVANCE Professor, College of Engineering; Director of the Center for Health and Humanitarian Systems. `pinar@isye.gatech.edu`
4. Amy Langville. College of Charleston. Professor; undergraduate advisor. `langvillea@cofc.edu`
5. Damon Williams. Georgia Institute of Technology. Teaching reference; Senior Lecturer and Director of the Center for Academics, Success, and Equity. `damon.williams@isye.gatech.edu`

PUBLICLY AVAILABLE TOOLS

Teaching dashboard for undergraduate optimization: (link)

Research dashboard for weight space decomposition: (link)

Github: (link)