

Niklas Rieken

Curriculum Vitae

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in niklas-rieken

I work in combinatorial optimization, with a particular focus on applications in auction theory. I'm especially fascinated by matroids—one of the most beautiful structures in combinatorics.

Education

- November 2025 **Doctorate (PhD)**, *Economics*, RWTH Aachen University
Thesis: Matroid Optimization in Auction Theory
Final Grade: summa cum laude (highest distinction)
- May 2019 **Master of Science**, *Computer Science*, RWTH Aachen University
Thesis: Network Pricing Games with Atomic Splittable Followers
Final Grade: 1.4
- March 2017 **Bachelor of Science**, *Computer Science*, RWTH Aachen University
Thesis: Alphabets and Machines as Structures and Their Decision Problems
Final Grade: 2.5
- May 2012 **Abitur (German A-Levels)**, *Michael-Ende-Gymnasium*, Tönisvorst
Advanced Courses: Math and Physics
Final Grade: 2.6

Work Experience

- 2019–2025 **Doctoral Researcher**, *Chair of Management Science*, RWTH Aachen University
Researcher in Combinatorial Optimization and Algorithmic Game Theory.
Matchings, matroids, mechanism design, teaching courses in mathematical economics.
- 2017–2019 **Research Assistant**, *Chair of Operations Research*, RWTH Aachen University
Developer for GCG (*generic column generation*, MIP solver).
Performance tests, extracting statistics, and collecting information on vast instance sets.
- 2014–2019 **Teaching Assistant**, *Chair of Computer Science 7 / TCS*, RWTH Aachen University
TA for undergraduate courses in theoretical computer science.
Teaching exercise groups, grading assignments and exams.

Scientific Publications

- OR Letters 2025 **A Simplified Analysis of the Ascending Auction to Sell a Matroid Base**
with Britta Peis
- ANRW 2025 **Using Explicit (Host-to-Host) Flow Measurements for Network Tomography**
with Ike Kunze, Constantin Sander, Alexander Ruhrmann, and Klaus Wehrle
- TEAC 2025 **Faster Dynamic Auctions via Polymatroid Sum**
with Katharina Eickhoff, Meike Neuwohner, Britta Peis, Laura Vargas Koch, and László A. Végh
- Networks 2024 **A flow-based ascending auction to compute buyer-optimal Walrasian prices**
with Katharina Eickhoff, S. Thomas McCormick, Britta Peis, and Laura Vargas Koch
- WINE 2023 **Faster Ascending Auctions via Polymatroid Sum**
with Katharina Eickhoff, Britta Peis, Laura Vargas Koch, and László A. Végh
- MAPSP 2022 **A Primal-Dual and Primal-Greedy Approximation Framework for Weighted Covering Problems**
with Britta Peis, José Verschae, and Andreas Wierz

Scientific Talks

- July 3, 2025 **A Self-Reflecting Greedy Algorithm for Submodular Cover**
10th Gerhard Woeginger Research Colloquium, RWTH Aachen University
- May 27, 2025 **Combinatorial Optimization in Auction Design**
Seminar on Microeconomics, RWTH Aachen University
- November 28, 2023 **Selling Bases of a Matroid**
ORM PhD Seminar, RWTH Aachen University
- August 30, 2023 **An Ascending Auction for Computing Minimal Walrasian prices via the Matroid Partitioning Algorithm**
OR 2023, Universität Hamburg
- June 15, 2023 **Selling Bases of a Matroid**
13th Day on Computational Game Theory, Vrije Universiteit Amsterdam
- January 18, 2023 **Computing Walrasian Prices via Matroid Partitioning**
Santiago Workshop on Combinatorial Optimization, Universidad de Chile
- July 6, 2022 **Computing Buyer-Optimal Walrasian Prices in Multi-Unit Matching Markets via a Sequence of Max-Flow Computations**
Seminario AGCO, Universidad de Chile

Reviewer

- 2025 IPCO, ICALP, JOTA, TEAC
- 2024 ESA, DAM
- 2023 APPROX/RANDOM, WINE, DAM
- 2022 Omega
- 2021 WINE, SAGT, DAM

Teaching

as assistant

Summer 25	Einführung in Design und Analyse von Algorithmen	Summer 2024	Algorithmic Game Theory (for eco)
Winter 23/24	Strategic Decisions in Networks, Markets, and Politics	Summer 23	Algorithmic Game Theory (for CS)
Summer 22	Einführung in Design und Analyse von Algorithmen	Winter 21/22	Einführung in Management Science
Winter 20/21	Einführung in Management Science	Summer 20	Scheduling
Winter 19/20	Einführung in Management Science	always	Seminar Highlights in Optimization

as TA

Summer 19	Datenstrukturen und Algorithmen	Summer 17	Formale Systeme, Automaten, Prozesse
Winter 16/17	Berechenbarkeit und Komplexität	Summer 16	Formale Systeme, Automaten, Prozesse
Winter 15/16	Berechenbarkeit und Komplexität	Summer 15	Formale Systeme, Automaten, Prozesse
Summer 14	Formale Systeme, Automaten, Prozesse		

Supervised Theses

- Master BA 2025 Task Allocation to Strategic Agents via Auction
- Bachelor BA 2025 Auction Design for the Suppression of Shill Bids
- Bachelor CS 2024 Tailoring a Matroid-Constrained Ascending Vickrey Auction to Representable Matroids (*Schöneborn Award*)
- Bachelor BA 2024 Minimizing Player Regret in Routing Games through Robust Network Optimization

Master DADS 2023	Implementation and Analysis of an Ascending Vickrey Auction for Selling Bases of a Matroid
Master BA 2023	Computation of minimal market clearing prices in multi-unit auctions
Bachelor BA 2022	The Player Selection Process in American Pro Sports under Matroid Constraints and Fairness Considerations
Master CS 2022	The Impact of Traffic Lights in Nash Flows Over Time
Bachelor CS 2021	Resource Graph Games on Polymatroids
Master DADS 2020	Trading with intermediaries under a mechanism design point of view
Bachelor BA 2020	A Controlled Auction Market for Crossover Kidney Exchange

BA = Business Administration, CS = Computer Science, DADS = Data Analytics and Decision Science

Honors

Teaching Award **Prize for outstanding teaching activities, 2024**
Faculty 8 of Economics, RWTH Aachen University

Projects

Podcast **Algo2Go, topics in computer science and applied mathematics, 2021**
Co-hosted German podcast with Prof. Dr. Laura Vargas Koch and Dr. Björn Tauer to explain algorithms to a broad audience. Responsible for content planning, research, and production.

Coursework

- Convex Optimization
- Operations Research I + II
- Optimization with Modelling Languages
- Methods and Applications of Optimization
- Discrete Differential Geometry
- Satisfiability Checking
- Mathematical Logic I + II
- Logic and Games
- Applied Automata Theory
- Infinite Computations
- Complexity Theory
- Recursion Theory

Core Skills

Systems	GNU/Linux
Programming	Python, Bash, PHP, C/C++
Web & Data	HTML, CSS, SQL
Applications	LaTeX(+TikZ), Gurobi, git
Languages	German (native), English (proficient), Spanish (basics)

Personal Interests

- Table Tennis and Chess
- Guitar and Ukulele
- Reading, Movies, and Music
- Cooking, Board games