

# Nicolas Acevedo Villena

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## Education

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### Massachusetts Institute of Technology (MIT)

PHD IN OPERATIONS RESEARCH

Sept. 2024 - Present

- Expected Graduation: 2029.

### Universidad de Chile

MASTER IN OPERATIONS MANAGEMENT

2022 - 2023

- Thesis: Column Generation-Based Decomposition for Large-Scale Feature Selection Problems
- Graduated with Highest Honors (2<sup>nd</sup> highest GPA).

### Universidad de Chile

BACHELOR OF ENGINEERING SCIENCE IN INDUSTRIAL ENGINEERING

2017 - 2021

- Graduated with Highest Honors (Highest GPA).

## Interests

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Artificial Intelligence, Convex/Non-convex Optimization, Large-Scale Optimization, Optimization for Machine Learning.

## Research Experience

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### Operations Research Center @ MIT

Cambridge, MA

RESEARCH ASSISTANT. ADVISOR: HAIHAO (SEAN) LU

Sept. 2024 - Present

- Ongoing research on (1) Fairness in Machine Learning via Robust Constraints and Robust Soft Constraints, and (2) Numerical Stability of First-Order Methods-Based Solvers for Large-Scale Optimization Problems in GPU.

### FCFM / Universidad de Chile

Santiago, Chile

RESEARCH ASSISTANT. ADVISOR: FERNANDO ORDONEZ. CO-ADVISOR: RENAUD CHICOISNE

Aug. 2022 - July 2024

- Proposed a scalable decomposition framework for large-scale feature selection by reformulating unconstrained LASSO as an equivalent second-order cone program (SOCP). Developed a column-wise decomposition using conic-dual subproblems, achieving faster convergence than coordinate descent and Frank-Wolfe methods in regimes with highly correlated features.

### Complex Engineering Systems Institute

Santiago, Chile

RESEARCH ASSISTANT. ADVISOR: RICARDO MONTOYA. CO-ADVISOR: CHARLES THRAVES

Jan. 2021 - Jan. 2022

- Designed an online optimization approach for adaptive questionnaires, aiming to choose both the subset and sequence of socially polarized questions while maximizing expected information gain. Modeled the task as an online variant of matrix completion and solved it with an ensemble of predictive models, probabilistic greedy policies, and dynamic programming for sequential decision-making.

### Complex Engineering Systems Institute

Santiago, Chile

RESEARCH ASSISTANT. ADVISOR: CHARLES THRAVES

Sept. 2020 - March 2022

- Designed and implemented an outlier-detection protocol for Chile's university selection exam (SAT-like), integrating an ensemble of statistical discrepancy measures, clustering-based screening, and outlier-detection models to generate a single interpretable anomaly score per test taker. Validated and presented the methodology to DEMRE, the government agency responsible for administering the exam.

## Work Experience

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### Web Intelligence Centre (WIC) / ACHS

Santiago, Chile

RESEARCHER

Dec. 2023 - Apr. 2024

- Collaborated with Asociación Chilena de Seguridad (ACHS) and the WIC on demand forecasting and appointment capacity planning for Hospital del Trabajador. Developed department-level patient volume forecasts (Prophet, NeuralProphet), integrated them into a second-stage scheduling optimization, and compared performance against a prediction-to-prescription baseline using Random Forest and XGBoost.

## **Nezasa AG / TripYeah**

Zurich, Switzerland

### RESEARCH ENGINEER

June 2022 - April 2023

- Supervised the development of a time-dependent TSP (TD-TSP) formulation and the preliminary stage of a custom solver for a travel-tech company (former TripYeah) to rank and select optimal flight itineraries in different senses. Captured time-dependent feasibility and costs across combinations of departure/arrival times and destinations, optimizing objectives including price and total travel duration.
- Developed both, a probabilistic and a machine learning-based predictive edge-pruning models, to reduce the TD-TSP graph size (exponential size), while improving both the optimization solving time and the cost efficiency of the implementation. Achieved a~20% reduction in feasible edges while maintaining the optimal solution inside of the reduced feasible set on ~90% of the tested instances (empirical results-only).

## **Hogar de Cristo**

Santiago, Chile

### INTERNSHIP

Jan. 2020 - Feb. 2020

- Designed an online beneficiary tracking process for different assistance programs within a non-profit and non-governmental organization (NGO). Further, implemented an automated bot for an online web scraping to check the status and requirements of funding application processes of the NGO.

## **Teaching Experience**

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### TEACHING ASSISTANT

- Spr. 2026 **The Analytics Edge**, MBA Course, Sloan School of Management, MIT.
- Spr. 2024 **Optimization Models and Algorithms**, Graduate Course, Universidad de Chile.
- Spr. 2023 **Optimization Models and Algorithms**, Graduate Course, Universidad de Chile.  
**Modeling and Optimization**, Undergraduate Course, Universidad de Chile.
- Spr. 2022 **Probability**, Undergraduate Course, Universidad de Chile.  
**Quantitative Marketing**, Graduate Course, Universidad de Chile.  
**Organizational Economics**, Graduate Course, Universidad de Chile.
- Fall 2021 **Decision Making Under Uncertainty**, Undergraduate Course, Universidad de Chile.  
**Statistics**, Undergraduate Course, Universidad de Chile.
- Spr. 2021 **Probability**, Undergraduate Course, Universidad de Chile.  
**Applied Econometrics for Business and Economics**, Undergraduate Course, Universidad de Chile.
- Fall 2020 **Modeling and Optimization**, Undergraduate Course, Universidad de Chile.  
**Operations Management I**, Undergraduate Course, Universidad de Chile.

## **Grants & Awards**

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- 2023 **Best Master Thesis Award**, FCFM, Universidad de Chile.
- 2022 **Chilean grant for graduate studies (Beca Magíster Nacional)**, ANID, government funding agency.
- 2022 **Academic excellence scholarship (Beca de Excelencia Académica)**, Master in Operations Management.
- 2019, '20,  
'21, '22 **Outstanding Student**, FCFM & DII, Universidad de Chile. Top 10% GPA students.

## **Extras**

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### TALKS

Acevedo Villena, N., Thraves, C., Varas, M. 2022. On the Outlier Detection for Standardized Tests. *XIV Chilean Conference on Operations Research*, Universidad Católica del Maule, Talca, Chile.

### POSTERS

Acevedo Villena, N., Ordonez, F. 2023. Column Generation-Based Decomposition for Large-Scale Feature Selection Problems. *Escuela de Verano en Inteligencia Computacional*, Facultad de Ciencias Físicas y Matemáticas, Santiago, Chile.

### DEVELOPMENT

*XVIII Summer School in Discrete Mathematics*. 2023. Instituto de Sistemas Complejos de Valparaíso, Valparaíso, Chile. Three courses: Graphs with high chromatic number, Provable Algorithms for Data Mining and Machine Learning, and Linear programming: the quest for strongly polynomial algorithms.