

VÍCTOR BUCAREY LÓPEZ

Universidad de O'Higgins, Institute of Engineering Sciences, Rancagua, Chile.

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RESEARCH INTERESTS

Bilevel Optimization, Data-driven optimization, Game Theory.

EDUCATION AND DEGREES

Universidad de Chile, Santiago, Chile

2013- 2017

- Ph.D. in Engineering Systems.
- Dissertation title: *Addressing Problem Size in Stackelberg Security Games*.

Universidad de Chile, Santiago, Chile

2011-2013

- M.Sc. in Operations Research.

Universidad de Chile, Santiago, Chile

2006-2011

- Industrial Engineer Degree.

WORK EXPERIENCE

Institute of Engineering Sciences, Universidad de O'Higgins, Rancagua, Chile

Assistant Professor

August 2021 - Present

Institute of Complex Systems of Engineering Santiago, Chile

Researcher

November 2023 - July 2025

Data Lab Analytics, Vrije Universiteit Brussel, Brussels, Belgium

Senior Researcher

July 2020 - July 2021

- **Interfaces between Machine Learning and Combinatorial Optimization:** Learning for hard combinatorial optimization problems and efficient algorithms to solve difficult prediction + optimization problems

Université Libre de Bruxelles, Brussels, Belgium

Postdoctoral Fellow

June 2018 - June 2020

- **Algorithms and Modelling in Bi-level Optimization:** Design and comparison of different algorithms and approximations to solve bi-level optimization problems with applications in pricing, security and network design.

Universidad de Chile, Santiago, Chile

Research Assistant

March 2012- May -2018

- **Stochastic Stackelberg Security Games:** Design and comparison of different algorithms and approximations to solve Stochastic Stackelberg Security Games.
- **Models and Algorithms for the Police Districting Problem:** Mixed Integer linear models to solve the districting problem in the police context, including shape considerations and balance in the workload.

University of Southern California, Los Angeles, CA

Research Internship

October 2015- January 2016

- **Abstractions to Solve Opportunistic Crime Security Games at Scale.:** Design of a Multi-layer algorithms to solve large games where the strategies are learned by the defender.

Institute Complex Engineering System, ISCI, Chile

Scientific Consultant

2010-May 2018

- Scientific consultant in a outreach and education program *Comunidad InGenio*. The activities performed were the development of different educative resources aimed at high school students to teach math and also show the research of the institute. (<http://www.comunidadingenio.cl>)

PUBLICATIONS

Journal articles and Book chapters

1. Bustamante, P., **Bucarey, V.**, Labbe, M., Marianov, V., & Ordoñez, F. Novel valid inequalities and branch-and-price for Stackelberg Security Games. *Computers and Operations Research* (2025). <https://doi.org/10.1016/j.cor.2025.107122>
2. **Bucarey, V.**, González-Blanco, N., Labbé, M. & Mesa, J. A. . On λ -cent-dians and generalized-center for network design: formulations and algorithms. Accepted in *Annals of Operations Research* (2025).
3. **Bucarey, V.**, González-Blanco, N., Labbé, M. & Mesa, J. A. . On λ -cent-dians and generalized-center for network design: definitions and properties. *Annals of Operations Research* (2025). <https://doi.org/10.1007/s10479-025-06536-5>
4. Mandi, J., Kotary, J., Berden, S., Mulamba, M., **Bucarey, V.**, Guns, T., & Fioretto, F. (2024). Decision-focused learning: Foundations, state of the art, benchmark and future opportunities. *Journal of Artificial Intelligence Research*, 80, 1623-1701
5. Bustamante, P., **Bucarey, V.**, Labbe, M., Marianov, V., & Ordoñez, F (2024) Playing Stackelberg Security Games in Perfect Formulations. *Omega* DOI: 10.1016/j.omega.2024.103068
6. Canoy, R., **Bucarey, V.**, Mandi, J., Mulamba, M., Molenbruch, Y. & Guns, T. (2024). Probability estimation and structured output prediction for learning preferences in last mile delivery. *Computers & Industrial Engineering*, 109932. (preprint at <https://arxiv.org/abs/2201.10269>)
7. Canoy, R., **Bucarey, V.**, Mandi, J., & Guns, T. (2023). Learn and route: learning implicit preferences for vehicle routing. *Constraints* 28, 363–396 (2023). <https://doi.org/10.1007/s10601-023-09363-2>
8. **Bucarey, V.**, Della Vecchia, E., Jean-Marie, A., Ordoñez, F. (2022). Stationary Strong Stackelberg Equilibrium in Discounted Games. *IEEE Transaction on Automatic Control*. DOI: 10.1109/TAC.2022.3220512
9. Jean-Marie, A., Tidball, M., & **Bucarey, V.** (2021). The Stackelberg games of water extraction with myopic agents. *International Game Theory Review*, <https://doi.org/10.1142/S0219198921500237>.
10. **Bucarey, V.**, Casorrán, C., Labbé, M., Ordoñez, F., & Figueroa, O. (2021). Coordinating resources in stackelberg security games. *European Journal of Operational Research*, 291(3), 846-861.
11. **Bucarey, V.**, Labbé, M., Morales, Juan M., & Pineda, S. (2021) An exact dynamic programming approach to segmented isotonic regression. *Omega*, doi:<https://doi.org/10.1016/j.omega.2021.102516>
12. **Bucarey, V.**, Fortz, B., González-Blanco, N., Labbé, M., & Mesa, J. A. (2021). Benders decomposition for Network Design Covering Problems. *Computers & Operations Research*. <https://doi.org/10.1016/j.cor.2021.105417>
13. **Bucarey, V.**, Elloumi, S., Labbé, M., Plein, F. (2020). Models and Algorithms for the Product Pricing with Single-Minded Customers Requesting Bundles. *Computers & Operations Research*. <https://doi.org/10.1016/j.cor.2020.105139>
14. **Bucarey, V.**, Ordoñez, F., & Bassaletti, E. (2015). Shape and Balance in Police Districting. In *Applications of Location Analysis* (pp. 329-347). Springer International Publishing.

Peer-reviewed proceedings

1. **Bucarey, V.**, Calderón, S., Muñoz, G., & Semet, F. (2024). Decision-focused predictions via pessimistic bilevel optimization: a computational study. *CPAIOR 2024*
2. Castillo, P., **Bucarey, V.**, Davila, S. & Quezada, F. (2024). Balancing Resources and Demand: A Bi-Objective Mixed-Integer Programming Approach of Healthcare Districts in Chile. In *Proceedings of the 13th International Conference on Operations Research and Enterprise Systems - ICORES*; pages 341-349. DOI: 10.5220/0012410100003639
3. Mandi, J., **Bucarey, V.**, Tchomba, M. M. K., & Guns, T. (2022). Decision-Focused Learning: Through the Lens of Learning to Rank. *Proceedings of the 39th International Conference on Machine Learning*, PMLR 162:14935-14947, 2022
4. Mandi, J., Canoy, R., **Bucarey, V.** & Guns, T. (2021). Data Driven VRP: A Neural Network Model to learn hidden preferences for VRP. *27th International Conference on Principles and Practice of Constraint Programming*

5. Mulamba, M., Mandi, J., Diligenti, M., Lombardi, M., **Bucarey, V.** & Guns, T. (2021). Contrastive losses and solution caching for predict-and-optimize In 30th International Joint Conference on Artificial Intelligence (IJCAI-21): IJCAI-21 (pp. 2833-2840)
6. **Bucarey, V.**, & Labbé, M. (2019). Discussion of Fairness and Implementability in Stackelberg Security Games. Decision and Game Theory for Security: 10th International Conference, GameSec 2019.
7. **Bucarey, V.**, Casorran C, Figueroa O, Rosas K, Navarrete H, Ordoñez F (2017) Building real stackelberg security games for border patrols. Decision and Game Theory for Security: 8th International Conference, GameSec 2017.
8. Zhang, C., **Bucarey, V.** Mukhopadhyay, A., Sinha, A., Qian, Y., Vorobeychik, Y., & Tambe, M. (2016). Using Abstractions to Solve Opportunistic Crime Security Games at Scale. In Proceedings of the 15th International Conference on Autonomous Agents and Multiagent Systems (AAMAS 2016).

Published preprints

1. **Bucarey, V.**, Calderón, S., Muñoz, G., & Semet, F. (2024). Decision-focused predictions via pessimistic bilevel optimization: complexity and algorithms.
2. Olivares, Marcelo, Yung, Daniel & **Bucarey, V.** Labor Planning and Shift Scheduling in Retail Stores Using Customer Traffic Data (September 18, 2020). Available at SSRN: (PDF)
3. **Bucarey, V.**, Della Vecchia, E., Jean-Marie, A., & Ordóñez, F. (2019). Stationary Strong Stackelberg Equilibrium in Discounted Stochastic Games.

AWARDED PROJECTS

Projects as PI

- Data-driven decision-making in Location and Transportation. Joint project with INRIA-Lille and USACH. ECOS-Anid. ECOS230033. 2024 - 2026. France-Chile.
- MICCHI: Mecanismos en Inventivos Contra la Crisis Hídrica. Concurso de Fomento a la Vinculación Internacional para Instituciones de Investigación Convocatoria 2023. FOVI230180 Anid-Chile.
- Decision-focused learning under the lens of mathematical programming, FONDECYT de Iniciación n°11220864, 2022-2025, ANID-Chile.
- CNRS, Appel unique mobilité entrante 2022. In collaboration with Renaud Chicoisne, ISIMA-LIMOS-Clermont Auvergne INP, Clermont-Ferrand, France. (3.500 euros)

Others

- BILENS: Bilevel optimization for Logistics, Energy and Security problems. ASSOCIATIVE TEAM. INRIA. France - Chile. 2025 - 2027. **Associate Researcher**
- Herramientas de machine learning y optimización para mejora de calidad de soluciones de ruteo de vehículos y última milla. Idea I+D 2025. ID25I10198. **Associate researcher**.
- A New Probabilistic Paradigm for Modelling Optimal Decision-Making Processes Under Uncertainty. PROYECTOS DE EXPLORACIÓN 2022 - ANID - Chile, 2022 - 2025. **Associate Researcher**
- BIOSEL: Bilevel Optimization in Security, Energy and Logistics. ASSOCIATIVE TEAM. INRIA. France - Chile. 2020 - 2024. **Associate Researcher**
- BIPLOS: Bilevel Problems in LOGistics and Security. ASSOCIATIVE TEAM. INRIA. France - Chile. 2017 - 2020. **Postdoctoral Researcher**
- Desarrollo de una Plataforma Software-as-a-Service para Apoyar Decisiones de Dotación de Personal en Cadenas de Retail. FONDEF n°: IT17I0066, 2018-2020. Conicyt- Chile **Postdoctoral researcher**.
- DyGaMe: Dynamic Games Methods. Stic-AmSud, 2016-2017. Conicyt- Chile **PhD Student**.

TEACHING

Student supervision: 3 master theses and 8 undergrads at the Engineering school at Universidad de O'Higgins, Chile.

Lecturer, Universidad de O'Higgins, School of Engineering

- *Data project 1 & 2* Fall 2023, Spring 2023, Fall 2024.
- *Evidence-based management.* Fall 2022.
- *Logistics, manufacturing and services.* Fall 2022,2023,2024,2025.
- Advanced Modelling for OR, Fall 2023 and 2025.

Instructor, Universidad de Chile, Department of Industrial Engineering

Undergrad

- *Modeling and Optimization.* Fall 2013, Fall 2014, Fall 2016, Fall 2018.
- *Operations Management I.* Spring 2013, Fall 2015, Fall 2017.

Teaching assistant, Universidad de Chile, Department of Industrial Engineering M.Sc. Public

Policy: *Economy and Public Policy.* Under Pablo Gonzalez and Cristina Holuigue. Spring 2011, Spring 2012.

M. Sc. Operations Research: *Operations Management in the Service Industry.* Under Richard Weber, Ricardo Montoya. Spring 2011. **Undergrad:** *Marketing II, Operations Management II, Economy, Modeling and Optimization.*

INDUSTRY COLLABORATIONS

1. **Intra-mine Concrete Vehicle Scheduling** Client: Xtreme Mining. **Lead Consultant.** August 2024 - April 2025
2. **Non-Technical Losses for the VAD Process 2024–2028** Client: Electric Distribution Companies of Chile. **Deputy Project Director.** March–December 2024.
3. **Peak Predictions of Energy Demand** **Deputy Project Director.** March 2024– April 2025.

ACADEMIC SERVICE

- MIP Workshop South America 2025: Local organizer and Committee member. <https://www.mixedinteger.org/MIPSouthAmerica/2025/>.
- Webmaster of the Bilevel Optimization Society (2025-2026)
- Founding committee member of the Bilevel Optimization Society, a branch of the Mathematical Optimization Society (MOS). 2023-2025.
- Chair IWOBIP: International Workshop on Bilevel Programming, Rancagua - Santa Cruz 2024. <https://iwobip2024.c>

SELECTED TALKS

1. *Decision-focused learning through the lens of bilevel optimization.* International Conference on bilevel optimization, University of Southampton 2023; ISMP 2024, Montreal.
2. *A comparison of decision-focused learning and risk-averse optimization.* IFORS, Santiago, Chile 2023.
3. *End-to-end decision-focussed learning over combinatorial problems.* YOUNG Online Seminar Series “Machine Learning NeEDS Mathematical Optimization” May 17th, 2021.
4. *Stationary Stochastic Strong Stackelberg Equilibrium.* June 19th, 2018, IWOBIP conference, Lille, France.
5. *Coordinating Resources: Matching Formulations for SSGs Applied to Border Patrolling.* January 15th, 2016. Teamcore at USC. October 22nd, 2017. Informs annual meeting, Houston, USA.
6. *A Mixed Integer Programming Approach for the Police Districting Problem.* May 25th, 2014, SIAM Conference on Optimization, San Diego, USA. October 23rd, 2013, X Optima, Concepción, Chile.
7. *How to teach crime analytics* July 17th, 2014. IFORS Barcelona, Spain.

RECOGNITIONS

- Informs Journal on Computing - Meritorius reviewer 2024.
- Best Part-time Professor. Department of Industrial Engineering, University of Chile, years 2013, 2014, 2016
- Best Teaching assistant. Department of Industrial Engineering, University of Chile, years 2011, 2012
- Dean's List. University of Chile, Engineering School, 2007, 2008, 2009

COMPUTATIONAL SKILLS

Daily usage of Python, AMPL, CPLEX, Gurobi, OR-Tools, KNITRO, LaTeX, R, Ms Excel.
Bases of QGis, MatLab, ZIMPL, Java, mySQL.

LANGUAGES

Native Spanish speaker, fluent in English. French (B1).

HOBBIES

I play bass guitar and keyboard as an amateur. I also enjoy practicing and watching soccer.

REFERENCES

1. Fernando Ordóñez, Full Professor, Departamento de Ingeniería Industrial, Universidad de Chile.
Mail: fordon@dii.uchile.cl
2. Martine Labbé, Full professor, Computer Science Department, Université Libre de Bruxelles.
Mail: martine.labbe@ulb.be