

# David Salas Videla

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INFORMATION                *e-mail:* david.salas@uoh.cl  
                                 *Personal webpage:* <http://davidsalasvidela.cl>

NATIONALITY                Chilean.

PERSONAL                    *Full Name:* David Sebastián Salas Videla.  
INFORMATION                *RUT:* 17.024.935-6  
                                 *Birthday:* October 22th, 1988.

LANGUAGES                  Spanish (Native); English (Proficient); French (Independent).

FILIATIONS                  Universidad de O'Higgins - Assistant professor.  
Center of Mathematical Modeling - Associate researcher.

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STUDIES                      **Ph. D. studies: Applied Mathematics and Modeling** [Thesis' advisor: Lionel Thibault], October 2013 - December 2016:  
[Institut Montpellierain Alexander Grothendieck](#), [Université de Montpellier](#), Montpellier, France.

**Professional title: Mathematical engineer** [Master's thesis' advisors: R. Correa, A. Hantoute - Graduated with Maximal Distinction], 2007 - 2013:  
[Departamento de Ingeniería Matemática](#), [Facultad de Ciencias Físicas y Matemáticas \(FCFM\)](#), Universidad de Chile. Santiago, Chile.

**BS in mathematical engineering** [Graduated with Maximal Distinction], 2007 - 2012  
[Departamento de Ingeniería Matemática](#), [Facultad de Ciencias Físicas y Matemáticas \(FCFM\)](#), Universidad de Chile. Santiago, Chile.

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ACADEMIC                    **Assistant professor** at [Instituto de Ciencias de la Ingeniería](#), Universidad de  
POSITIONS                    O'Higgins, Rancagua, Chile. March 2020 - Present.

**Post-Doctorate FONDECYT** at [Centro de Modelamiento Matemático \(CMM\)](#),  
Universidad de Chile, Santiago, Chile. April 2019 - March 2020.

**Post-Doctorate** at [Instituto de Ciencias de la Ingeniería](#), Universidad de O'Higgins,  
Rancagua, Chile. September, 2018 - April 2019.

**Post-Doctorate (Chercheur Contractuel)** at [INP - ENSIACET](#), Toulouse, France.  
September, 2017 - August 2018.

**Post-Doctorate (Chercheur Contractuel)** at [PROMES CNRS](#), Perpignan, France.  
October, 2016 - July 2017.

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FIELDS OF  
INTEREST

**Variational Analysis and Dynamical Systems:** I study nonsmooth dynamical systems, induced by descent dynamics, sweeping processes and other variational dynamics. I'm also interested in nonsmooth first-order calculus in the convex and nonconvex setting.

**Differential geometry in Variational Analysis:** I study the differential structure of mathematical objects in the context of variational analysis, such that the metric projection, manifolds in Hilbert spaces, o-minimal structures, among others.

**Optimization and Game Theory:** I'm interested in optimization and equilibrium problems in several settings, such as quasiconvex equilibrium problems, nonsmooth optimization, variational formulations, bilevel optimization and Multi-Leader-Follower games, both in the deterministic and stochastic setting. I study both, theoretical aspects and algorithms.

**Applications of Optimization and Learning:** I am interested in high impact problems where optimization, game theory and learning are involved. I study applications of these theories, such that sharing economies, cryptocurrencies, design of exchange networks and opinions in social networks. Problems in renewable energy, and management of natural resources have been one of my research lines in the recent years. I am also interested in problems of Operations research, logistic and economics in general.

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TEACHING  
EXPERIENCE

**Lecturer** at [Universidad de O'Higgins](#), in the following courses (and their semesters):

- Introduction to Discrete mathematics - Fall 2023.
- Ordinary differential equations - Fall 2023.
- Non-linear Optimization - Spring 2020, Spring 2021.
- Calculus - Fall 2022.
- Advanced Calculus - Fall 2020, Fall 2021.
- Probability and Statistics - Fall 2020.
- Linear Algebra - Spring 2018, Spring 2020, Spring 2021.
- Game Theory - Fall 2021, Fall 2022.

**Lecturer** at the [École d'Ingénieurs Énergies Renouvelables - Sup'EnR](#) (Perpignan), in the following courses (and their semesters):

- Probability and Statistics (Mathematics 3 - 4th year) - Fall 2017.

**Lecturer** at the [Mathematical Engineering Department](#) (Universidad de Chile), in the following courses (and their semesters):

- Introduction to Bilevel Optimization (**Doctorate school**) - Fall 2023.
- Real Analysis (**Doctorate school**) - Fall 2019.
- Multivariable Calculus - Spring 2018, Spring 2019.
- Linear Algebra - Spring 2015.

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PUBLICATIONS  
(18)

D. Salas and A. Svensson. Existence of solutions for deterministic bilevel games under a general Bayesian approach. To appear in *SIAM Journal on Optimization*, 2023. e-print arXiv:2010.05368v5

D. Aussel, K. Cao Van, D. Salas. Optimal design of exchange water networks with control inputs in Eco-Industrial Parks. *Energy Economics*, Vol. 120, pp. 106480. <https://doi.org/10.1016/j.eneco.2022.106480>. e-print arXiv:2204.09863

A. Daniilidis and D. Salas. A determination theorem in terms of the metric slope. *Proceedings of American Mathematical Society*, Vol. 150, n<sup>o</sup>10, pp. 4325-4333, 2022. <https://doi.org/10.1090/proc/15958>. e-print arXiv:2109.13721

D. Aussel, K. Cao Van and D. Salas. Existence results for Generalized Nash Equilibrium Problems under continuity-like properties of sublevel sets. *SIAM Journal of Optimization*, Vol. 31, n<sup>o</sup>4, pp. 2784-2806, 2021. <https://doi.org/10.1137/20M1353629>

N. Dkhili, D. Salas; J. Eynard; S. Thil; S. Grieu. Innovative Application of Model-Based Predictive Control for Low-Voltage Power Distribution Grids with Significant Distributed Generation. *Energies*, Vol. 14, n<sup>o</sup> 6, pp. 1773, 2021. <https://doi.org/10.3390/en14061773>

D. Salas and L. Thibault. Quantitative characterizations of nonconvex bodies with smooth boundaries in Hilbert spaces via the metric projection. *Journal of Mathematical Analysis and Applications*, Vol. 494, n<sup>o</sup> 2, 2021. <https://doi.org/10.1016/j.jmaa.2020.124588>

P. Pérez-Aros, D. Salas and E. Vilches. Determination of convex functions via subgradients of minimal norm. *Mathematical Programming - Series A*, Vol. 190, n<sup>o</sup> 1, pp. 561-583, 2021. <https://doi.org/10.1007/s10107-020-01550-w>

D. Salas, K. Cao Van, D. Aussel and L. Montastruc. Optimal design of exchange networks with blind inputs and its application to Eco-industrial parks. *Computers & Chemical Engineering*, Vol. 143, 2020. <https://doi.org/10.1016/j.compchemeng.2020.107053>

P. Pérez-Aros, D. Salas and E. Vilches. On formulae for the Ioffe geometric subdifferential of supremum function. *Journal of Convex Analysis*, Vol. 27, n<sup>o</sup>2, pp. 487-508, 2020. <https://www.heldermann.de/JCA/JCA27/JCA272/jca27026.htm>

D. Aussel, K. Cao Van, and D. Salas. Existence results for solutions of quasi-variational inequalities over product sets with quasi-monotone operators, *SIAM Journal on Optimization*, Vol. 29, n<sup>o</sup> 2, pp. 1558-1577, 2019. <https://doi.org/10.1137/18M1191270>

D. Salas and L. Thibault. On characterizations of submanifolds via smoothness of the distance function in Hilbert spaces. *Journal of Optimization Theory and Applications*, Vol. 189, n<sup>o</sup>1, pp. 189-210, 2019. <https://doi.org/10.1007/s10957-019-01473-3>

D. Salas, L. Thibault and E. Vilches. On Smoothness of solutions to projected differential equations. *Discrete and Continuous Dynamical Systems - Series A*, Vol. 39, n<sup>o</sup> 4, pp. 2255-2283, 2019. <https://doi.org/10.3934/dcds.2019095>

E. Tapachès, D. Salas, M. Pierre-Muzet, S. Mauran, D. Aussel, and M. Mazet. The value of thermo-chemical storage for CSP: Relevance of peak production strategy on both dimensional and operational optimization. *Energy Conversion and Management*, Vol. 198, 2019. <https://doi.org/10.1016/j.enconman.2018.11.082>

D. Salas, E. Tapachès, M. Mazet and D. Aussel. Pre-scenarios as economic evaluation technique for thermo-chemical storage in solar plants. *Energy Conversion and Management*, Vol. 174, pp. 932-954, 2018. <https://doi.org/10.1016/j.enconman.2018.08.079>

R. Correa, D. Salas and L. Thibault. Smoothness of the Metric Projection onto Non-convex Bodies in Hilbert Spaces. *Journal of Mathematical Analysis and Applications*, Vol. 457, n<sup>o</sup> 2, pp. 1307-1332, 2018. <https://doi.org/10.1016/j.jmaa.2016.08.064>

D. Salas. Convex smooth-like properties and Faces Radon-Nikodým property in Banach spaces. *Studia Mathematica*, Vol. 240, n<sup>o</sup> 3, pp. 231-253, 2018. <https://doi.org/10.4064/sm8440-3-2017>

D. Salas and S. Tapia-García. Extended Seminorms and Extended Topological Vector Spaces. *Topology and its Applications*, Vol. 210, pp. 317-354, 2016. <https://doi.org/10.1016/j.topol.2016.08.001>

R. Correa, A. Hantoute and D. Salas. Integration of nonconvex epi-pointed functions in locally convex spaces. *Journal of Convex Analysis*, Vol. 23, n<sup>o</sup> 2, pp. 511-530, 2016. <https://www.heldermann.de/JCA/JCA23/JCA232/jca23019.htm>

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CONFERENCE  
PAPERS (2)

N. Dkhili, D. Salas, J. Eynard, S. Thil, S. Grieu. An Application of Model-based Predictive Control for Renewables-intensive Power Distribution Grids. *21st IFAC-V World Congress*, Berlin, Germany, July 12-17, 2020. In: *IFAC-PapersOnline*, Vol. 53, Issue 2, pp.13262-13268, 2020. <https://doi.org/10.1016/j.ifacol.2020.12.155>

G. Muñoz, D. Salas, A. Svensson. Exploiting the polyhedral geometry of stochastic linear bilevel programming. *IPCO 2023: The 24th Conference on Integer Programming and Combinatorial Optimization*, Madison, Wisconsin, USA, June 21-23, 2023. (Accepted - to appear)

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## PREPRINTS (4)

A. Daniilidis, L. Miclo, D. Salas. Descent modulus and applications. arXiv:2211.118198

G. Muñoz, D. Salas and A. Svensson. Exploiting the polyhedral geometry of stochastic linear bilevel programming (full length version). arXiv:2211.02268

A. Jofré, A. Pardo, D. Salas, V. Verdugo and J. Verschae. The Convergence Rates of Blockchain Mining Games: A Markovian Approach. arXiv:2107.08077

G. Liberona, L. von Niederhäusern and D. Salas. The value of shared information in ridesharing problems: a stochastic Stackelberg game approach. arXiv:2201.00061

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## MANUSCRIPTS (2)

**Ph.D thesis:** *Détermination sous-différentielle, propriété Radon-Nikodým de faces, et structure différentielle des ensembles prox-réguliers*, Université de Montpellier, Montpellier, France, 2016.

**Master's thesis:** *Fórmula de integración en espacios con la propiedad de continuidad del subdiferencial*, Universidad de Chile, Santiago, Chile. 2013.

## FUNDING AND AWARDS

FONDECYT Iniciación project 11220586: *Optimization and Games with Decision-Dependent Uncertainty: Theory, Algorithms and Applications*. March 2022- March 2025. **Role:** Principal Researcher.

Internal Multidisciplinary projects of O'Higgins University MSM2021003: *Gestión Inteligente de Recursos Hídricos para la Agricultura*. September 2021 - September 2023. **Role:** Project's Director.

FONDECYT Post-doctorate fellowship 3190229: *Nonsmooth dynamical system involving regular structures*. March 2019- March 2022. **Role:** Principal Researcher.

[Math-Amsud](#) project 20-MATH-08: *Stochastic Optimization, Chance Constraints and Applications to Energy*. 2020-2021. **Role:** Co-Researcher.

## RESEARCH ADVISING

Ph.D. Advisor of **Gianfranco Liberona**. [Mathematical Engineering Department](#), Universidad de Chile. 2020-2023. Thesis defense held on January 10th, 2023.

Ph.D. Co-Advisor of **Daniel Lasluisa**. [Mathematical Engineering Department](#), Universidad de Chile. 2020-Present.

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Master's thesis Advisor of **Evelyn Lorca**. [Mathematical Engineering Department](#), Universidad de Chile. 2021-Present.

Master's thesis Advisor of **Javiera Gutierrez**. [Mathematical Engineering Department](#), Universidad de Chile. 2023-Present.

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Post-doctorate supervisor of **Andrés Cristi**. [Center of Mathematical Modeling](#), Universidad de Chile. March 2023- Present.

Post-doctorate supervisor of **Léonard von Niederhäusern**. [Center of Mathematical Modeling](#), Universidad de Chile / [Instituto de Ciencias de la Ingeniería](#), Universidad de O'Higgins. June 2020-February 2021.

Sponsor Researcher of **Anton Svensson** with the project [FONDECYT post-doctorado call 2021](#). *Stochasticity aspects in bilevel games and applications to water resource management*. [Instituto de Ciencias de la Ingeniería](#), Universidad de O'Higgins. 2020-2021.

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SELECTED  
CONFERENCES

*Latin American Workshop on Optimization and Control - LAWOC 2022*. January 16th - January 20th, 2023. Rancagua, Chile [Organizing Committee]

*Workshop on Algebraic Real Geometry and Optimization - ARGO 2022*. August 30th - September 2nd, 2022. Santiago, Chile [Organizing Committee]

*9th French-Chilean Meeting on Optimization - JFCO 2022*. June 29th - July 1st, 2022. Perpignan, France [Organizing Committee]

*2nd International Workshop on Variational Analysis and Applications for Modelling of Energy Exchange - VAME 2022*. May 9-10, 2022. Perpignan, France [Talk]

*LXXXIX encuentro anual de la Sociedad Matemática de Chile*. December 15-17, 2021. Rancagua, Chile [Organizing Committee]

*SIAM Conference on Optimization (OP21)*. July 20-23, 2021, Virtual Congress [Talk].

*14th International Seminar on Optimization and Related Areas - ISORA*. October 7-10, 2019. Lima, Perú [Talk]

*LXXXVII encuentro anual de la Sociedad Matemática de Chile*. December 19-21, 2018. Rancagua, Chile [Organizing Committee, Talk]

*ISMP2018 - 23rd International Symposium on Mathematical Programming*. July 1-6, 2018. Bordeaux, France. [Talk]

*LOPAL'2018 - International Conference on Learning and Optimization Algorithms: Theory and Applications*. May 2-5, 2018. Ensias, Morocco [Talk].

*International Workshop on Optimization and Variational Analysis*. January 10-11, 2018. Rancagua, Chile. [Organizing Committee, Talk]

*Variational Analysis and Applications for Modelling of Energy Exchange*. Mai 4-5, 2017. Perpignan, France. [Organizing Committee]

*Congreso Bienal de la Real Sociedad Matemática Española*. January 30 - February 03, 2017. Zaragoza, Spain. [Talk]

*Last Edition: April, 2023.*