David Salas Videla

ADDRESS	Alfredo Barros Errázuriz, Dpto. 607 Santiago, Chile.
CONTACT INFORMATION	*Phone (Chile):* +56 985275721 *e-mail:* david.salas@uoh.cl *Personal webpage:* http://davidsalasvidela.cl
NATIONALITY	Chilean.
PERSONAL INFORMATION	*Full Name:* David Sebastián Salas Videla. *RUT:* 17.024.935-6 *Birthday:* October 22th, 1988.
LANGUAGES	Spanish (Native); English (Proficient); French (Independent).
FILIATIONS	Universidad de O'Higgins - Associate professor. Center of Mathematical Modeling - Asociate researcher.

STUDIES

Ph. D. studies: Applied Mathematics and Modeling [Thesis' advisor: Lionel Thibault], October 2013 - December 2016: Institut Montpelliérain 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.

ACADEMIC POSITIONS

Associate professor at Instituto de Ciencias de la Ingeniería, Universidad de O'Higgins, Rancagua, Chile. June 2023 - Present.

Assistant professor at Instituto de Ciencias de la Ingeniería, Universidad de O'Higgins, Rancagua, Chile. March 2020 - June 2023.

Post-Doctoral researcher (FONDECYT) at Centro de Modelamiento Matemático (CMM), Universidad de Chile, Santiago, Chile. April 2019 - March 2020.

Post-Doctoral researcher at Instituto de Ciencias de la Ingeniería, Universidad de O'Higgins, Rancagua, Chile. September, 2018 - April 2019.

Post-Doctoral researcher (Chercheur Contractuel) at INP - ENSIACET, Toulouse, France. September, 2017 - August 2018.

Post-Doctoral researcher (Chercheur Contractuel) at PROMES CNRS, Perpignan, France. October, 2016 - July 2017.

FIELD 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 and metric analysis in Optimization: I study the metric and differential structure of mathematical objects in the context of variational analysis, such that the metric projection, manifolds in Hilbert spaces, o-minimal structures, metric slopes, among others.

Bilevel optimization and game theory: I am 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.

TEACHING EXPERIENCE (SELECTED)

- **Advanced Calculus** - Universidad de O'Higgins - Fall 2020, Fall 2021, Spring 2023, Fall 2024.

- **Multivariable Calculus** - Universidad de Chile - Spring 2018, Spring 2019.

- **Linear Algebra** - Universidad de O'Higgins - Spring 2018, Spring 2020, Spring 2021.

- **Linear Optimization** - Universidad de O'Higgins - Fall 2022.

- **Nonlinear Optimization** - Universidad de O'Higgins - Spring 2020, Spring 2021.

- **Advanced method in Optimization** - Universidad de O'Higgins - Spring 2023.

- **Game Theory** - Universidad de O'Higgins - Fall 2021, Fall 2022.

- **Introduction to Bilevel Optimization (Doctorate school)** - Universidad de Chile - Fall 2023.

- **Real Analysis (Doctorate school)** - Universidad de Chile - Fall 2019.

A. Daniilidis, L. Miclo, D. Salas. Descent modulus and applications. *Journal of Functional Analysis*, Vol. 287, nº 11, pp. 110626, 2024 https://doi.org/10.1016/j.jfa.2024.110626.

A. Daniilidis, D. Salas. Steepest geometric descent for regularized quasiconvex functions. *Set-Valued and Variational Analysis*, Vol. 32, article 28, 2024. https://doi.org/10.1007/s11228-024-00731-5.

A. Daniilidis, D. Salas and S. Tapia-García. A slope generalization of Attouch theorem. *Mathematical Programming - Series A*, pp. 1-30, 2024. https://doi.org/10.1007/s10107-024-02108-w.

G. Muñoz, D. Salas and A. Svensson. Exploiting the polyhedral geometry of stochastic linear bilevel programming. *Mathematical Programming - Series B*, pp.1-36, 2024. https://doi.org/10.1007/s10107-024-02097-w. e-print arXiv:2211.02268

D. Lasluisa, D. Salas, N. Mazet, D. Aussel.Multidimensional analysis for the techno-economic study of the CSP plant. *Journal of Energy Storage*, Vol. 86, pp. 110732, 2024. https://doi.org/10.1016/j.est.2024.110732.

G. Liberona, D. Salas and L. von Niederhäusern . The value of Shared Information for allocation of drivers in ride-hailing: a proof-of-concept study. *Computational Management Science* Vol. 21, 4, 2024. https://doi.org/10.1007/s10287-023-00487-7

G. Liberona, A. Di Pretoro, S. Negny, L. Montastruc, D. Salas. Robustness in optimal design of Eco-Industrial Parks under the lens of two-stage stochastic optimization. *Computers & Chemical Engineering*, Volume 179, pp. 108399, 2023. https://doi.org/10.1016/j.compchemeng.2023.108399.

D. Salas and A. Svensson. Existence of solutions for deterministic bilevel games under a general Bayesian approach. *SIAM Journal on Optimization*, Vol. 33, nº 3, pp. 2311-2340, 2023. https://epubs.siam.org/doi/10.1137/21M1442164. 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, nº10, 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, nº4, 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, nº 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, nº 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, nº 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 Analisis*, Vol. 27, nº2, 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, nº 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, nº1, 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, nº 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 Nonconvex Bodies in Hilbert Spaces. *Journal of Mathematical Analysis and Applications*, Vol. 457, nº 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, nº 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, nº 2, pp. 511-530, 2016. https://www.heldermann.de/JCA/JCA23/JCA232/jca23019.htm

. . . .

Conference papers (3)

G. Liberona, D. Salas. Calificación Basada en Competencias: Adaptaciones Docentes en un Curso Transversal de Ingeniería Civil en una Universidad Estatal Chilena. *CLABES: XIII Congreso Latinoamericano sobre Abandono en Educación Superior*. October 23th - October 25th, 2024. Heredia, Costa Rica.

G. Muñoz, D. Salas, A. Svensson. Exploiting the polyhedral geometry of stochastic linear bilevel programming. In: Del Pia, A., Kaibel, V. (eds) *Integer Programming and Combinatorial Optimization. IPCO 2023*. Lecture Notes in Computer Science, Vol. 13904, pp 363-377, 2023. https://link.springer.com/chapter/10.1007/978-3-031-32726-1_26

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

. . . .

Preprints/ In preparation (6)

J. Gutiérrez-Ramírez, D. Salas, V. Verdugo. Mean-Field opinion dynamics of partially stubborn agents in random graphs. *In preparation.*

A. Cristi, D. Salas. Towards closing the gap of information complexity in convex optimization on large sets. *In preparation.*

G. Contador, G. Muñoz, D. Salas, A. Svensson. Random Cell Exploration and its applications to Bilevel Programming. *In preparation.*

A. Fielbaum, D. Salas, R. Zhang, F. Castro. Idle wage as a tool to regulate the relationship between ride-hailing platforms and drivers. arXiv:2408.13421.

D. Aussel, D. Lasluisa, D. Salas. Cardinality Constraints in Single-Leader-Multi-Follower games. arXiv:2403.19074

A. Daniilidis, T. Minh Le, D. Salas. Metric compatibility and determination in complete metric spaces. arXiv:2308.14877

. . . .

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.

Fundings and Awards

Internal Multidisciplinary projects of O'Higgins University MSM2021003: *Gestión Inteligente de Recursos Hídricos para la Agricultura.* September 2021 - March 2024. **Role:** 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.

ADVISING

....

PH.D. THESIS	**Gianfranco Liberona**. Mathematical Engineering Department, Universidad de Chile. 2020-2023. Thesis defense held on January 10th, 2023.
	Daniel Lasluisa. Mathematical Engineering Department, Universidad de Chile. 2020-2024. Thesis defense held on March 25th, 2024.

....

MASTER'S THESIS	**Evelyn Lorca**. Mathematical Engineering Department, Universidad de Chile. 2021-2023. Thesis defense held on June 25th, 2023.
	Javiera Gutierrez. Mathematical Engineering Department, Universidad de Chile. 2023-2024. Thesis defense held on August 13th, 2024.

....

POST-DOC SUPERVISION	**Francisco Venegas**. Instituto de Ciencias de la Ingeniería, Universidad de O'Higgins. August 2023- Present.
	Andrés Cristi. Center of Mathematical Modeling, Universidad de Chile. March 2023 - June 2024.
	Léonard von Niederhaürsern. Center of Mathematical Modeling, Universidad de Chile / Instituto de Ciencias de la Ingeniería, Universidad de O'Higgins. June 2020- February 2021.
	Anton Svensson. Sponsor Researcher of 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.

....

UNDERGRADUATE MEMOIRS	**Jaime Rodriguez** (Universidad de O'Higgins, 2024).

OTHER ACTIVITIES

- Member of the Academic Council - Universidad de O'Higgins. July 2021 - Present.
  https://www.uoh.cl/universidad/rectoria/consejo-academico/

- Member of the Engineering Institute Council - Universidad de O'Higgins. June 2023 - Present.

- Teaching Innovation Project - Universidad de O'Higgins (2024): *Calificación Basada en Competencias: Adaptaciones Docentes en un Curso Transversal de la Escuela de Ingeniería.* 2024. **Role:** Director.

- Coordinator of the Induction Program in Mathematics - Universidad de O'Higgins. 2021 -2022.

Selected Conferences

- *3rd International Workshop on Variational Analysis and Applications for Modelling of Energy Exchange - VAME 2024.* May 13th-14th, 2024. Trier, Germany [Scientific Committee]

- *3rd International Workshop on Bilevel Optimization - IWOBIP'24.* January 22th-26th, 2024. Rancagua & Santa Cruz, Chile [Talk]

- *15th International Seminar on Optimization and Related Areas - ISORA.* October 2-6, 2023. Arequipa, Perú [Talk]

- *VAO 2023: International Workshop Variational Analysis and Optimization 2023* September 14th - September 15th, 2023. Messina, Italy [Invited Speaker]

- *IPCO 2023: The 24th Conference on Integer Programming and Combinatorial Optimization.* June 21th - June 23th, 2023. Madison, Wisconsin, USA [Talk, Peer Reviewed]

- *NAVAL 2023: Nonsmooth And Variational Analysis Conference.* In honour of Professor Lionel THIBAULT. June 26th - June 28th, 2023. Djon, France [Talk]

- *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 - Septemper 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. Brescia, Italy [Invited Speaker]

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

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

- *ISMP2018 - 23rd International Symposium on Mathematical Programming.* July 1-6, 2018. Bordeaux, France [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.* May 4-5, 2017. Perpignan, France [Organizing Committee]

Last Edition: August, 2024.