XXI Latin Ibero-American Conference on Operations Research

CLAIO 2022

December 12-15, 2022

Facultad de Ciencias Exactas y Naturales
Universidad de Buenos Aires
Buenos Aires, Argentina
Foreword

The Latin-Iberoamerican Conference on Operations Research takes place biennially since 1982 in different Latin American cities and is sponsored by the Association of Latin-Iberoamerican Operational Research Societies (ALIO). The main goals of this conference are to further the exchange of experiences, to establish and deepen ties between researchers and practitioners in the region, and to help young undergraduate and graduate students in their professional development.

The XXI edition of CLAIO takes place in Buenos Aires City, after the unfortunate cancellation of CLAIO 2020 due to the Covid pandemic. We are very happy to return to in-person conferences, and to host all of you in Buenos Aires!

This edition is special since it marks the 40th anniversary of the first CLAIO, which was held in Rio de Janeiro, Brazil, in 1982. In this edition we celebrate the contributions of Latin-American legends in OR, including Hugo Scolnik, Nelson Maculan, Jayme Szwarcfiter, and Andrés Weintraub. We are grateful for their work and their contributions to our discipline, and it is a honor for us to host them in CLAIO 2022.

CLAIO 2022 has received 446 abstracts and is hosting around 500 participants. The conference program includes six plenary talks, 80 sessions of contributed abstracts, and three special plenary sessions honoring legends of OR. It also hosts the “X Encuentro de la Red Iberoamericana de Evaluación y Decisión Multicriterio (RED-M)” and a special track on “OR in Health and Healthcare Services”. We gratefully acknowledge the authors of contributed abstracts, the session chairs, and the organizers of special sessions for making this conference possible.

On behalf of the program committee, the organizing committee, and the local committee, we hope that CLAIO 2022 is an inspiring and fruitful experience!

Guillermo Durán, Javier Marenco, and Paula Zabala
CLAIO 2022 co-chairs
CLAIO 2022 program committee

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CLAIO 2022 organizing committee

Guillermo Durán, Universidad de Buenos Aires, Argentina (co-chair)
Javier Marenco, Universidad de Buenos Aires + UNGS + UTDT, Argentina (co-chair)
Paula Zabala, Universidad de Buenos Aires, Argentina (co-chair)
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Pablo Rey, Universidad Tecnológica Metropolitana, Chile

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Mónica Braga, Universidad Nacional de General Sarmiento, Argentina
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Micaela Hirsch, Universidad de Buenos Aires, Argentina
Juan Pablo Lebon, Universidad de Buenos Aires, Argentina
Giovanni Marraffini, Universidad de Buenos Aires, Argentina
Acknowledgements

The organizing committee wishes to thank all the people who made CLAIO 2022 possible. Special thanks go to the local committee and the CLAIO 2022 staff for their hard work. In particular, we are indebted to Francisco Soulignac and Pablo Terlisky for preparing the equipment for the parallel sessions, Mónica Braga and María Pía Mazzoleni for getting the deliverables, and Manuela Blaum for coordinating the logistics. We gratefully acknowledge the invaluable assistance of Alejo Seillant and Guido Roncaglia from Fundacen for organizing and carrying out the payment procedures. Special thanks go to María Soledad Suárez Mazzone for her assistance with the conference administration, and to Analía Barroso for her help with the conference logistics. We are grateful towards Guido Rodríguez Migueres, Omar Metallo, Mateo Pinna, Miguel Acevedo, Guillermo Álvaro, and all the staff from the university for their help with the rooms and the equipment. In particular, many thanks go to Mariana for coordinating the conference spaces. We appreciate the help of Rodrigo González and Cristina Rodríguez with the software installations, and the help of Leonardo Zayat with the Internet connection in the conference venue. Many thanks to Karla Jaramillo, Soledad Arriagada, and Antonio Mauttone for their assistance with the printed matter, and to Armando Doria for his assistance with video recordings. We are indebted with the many people providing services for CLAIO 2022, including Sofía, Tamara, and Cristina from Cristal Palace Hotel, María Barreto and Laura Mena from Super A3, Yamila Martínez from GraboLaser, Federico Deker from Creaciones Morena, Abril from VLZ SRL, Santiago Gutiérrez from the university cafeteria, and Federico from La Copia. Finally, many thanks to Norberto Marenco for the research that led to the magnets holding the signs in the doors, and a special acknowledgement to Juan Pablo Marenco and Gabriel Marenco for the logistics with the backpacks. Thank you all!
MANIFESTO

Since the 1940s, Science of Logistics has been always a cornerstone of Operational Research.

Since November 2019, our planet has been hit by the new coronavirus (COVID-19). This seriously challenges our societies, economies, healthcare systems, education and several other services and infrastructures, all around the globe. The uncertainty that has been introduced by this hit, has caused serious confusion and indecision in different parts of our societies and has affected our lifestyle.

Most authorities (states, regions, cities, etc.) have opted for and instructed various forms of lockdown and restrictions, promoting social distancing, remote working, shutting down non-essential services and several others, aiming at controlling the spread of the virus and managing the capacity of health care systems.

The imbalanced spatial distribution of various facilities, in many districts and neighborhoods, has caused access problem for citizens. Some citizens have walking distance access to facilities in order to fulfil their primary needs while for others, the use of public transport (which is also used for home-to-work commute of workers in essential service sectors) remains inevitable. The latter being a challenge to the precautionary measures of social distancing, thus increasing the risk of spread.

We are talking about facilities associated with health, food, policing, energy, telecommunications, garbage collections, equipment, and so on. While under these circumstances, demand for some non-essential services has drastically dropped down, there is a need to identify new policies aiming at introducing an adequate level of access to the essential services and facilities. This is particularly the case in those less developed suburbs and neighborhoods wherein new facilities shall be launched.

Sure enough, there are and will be serious social and societal problems, where Operational Research could act by presenting decision scenarios. Given the growth in the number of positive cases of COVID-19, decisions need to be made quickly, avoiding further casualties.

This is the time for all Operational Research societies and those interested in emergency logistics to approach and place themselves at the disposal of the mayors of their cities, governors of their regions and the top representative of their countries.

It is our obligation to be at the forefront in the fight against this pandemic.

Nelson Maculan
Former President of International Federation of Operational Research Societies (IFORS, from 2013.01.01 to 2015.12.31)
Professor Emeritus, Federal University of Rio de Janeiro, Brazil
April 26, 2020
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**CLAIO 2022 – Parallel sessions**

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<td>Opening ceremony + Plenary session - &quot;CRIAB: Conflicts, risks and impacts associated with dams&quot;, Mario Martinez, Universidade Estadual de Campinas, Brazil</td>
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<td>Plenary session - Legends of OR III: From CLAIO 1982 to the future. History and perspectives of OR in Latin America</td>
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### CLAIO 2022 - Sessions summary

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<td>Special session honoring Andrés Weintraub</td>
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<td>Dec 14 11:10</td>
<td>Aula Magna</td>
<td>Plenary session - &quot;'Keep on Learning': towards the development of optimisers that continually adapt&quot;, Emma Hart (EURO Distinguished Lecturer), Edinburgh Napier University</td>
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<td>Dec 14 12:30</td>
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<td>Ibero-American Network on Multicriteria Evaluation and Decision</td>
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<td>Dec 15</td>
<td>11:10</td>
<td>Aula Magna</td>
<td>Plenary session - &quot;Applied mathematical optimization: success stories in logistics and planning&quot;, Antonio Alonso-Ayuso, Universidad Rey Juan Carlos, Spain</td>
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<td>Dec 15</td>
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<td>Democratization of OR through Artificial Intelligence</td>
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<td>Mixed Integer Programming II</td>
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<td>Special track: OR in Health and Healthcare Services II</td>
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<td>Dec 15</td>
<td>16:00</td>
<td>Aula Magna</td>
<td>Plenary session - &quot;OR in Healthcare in Latin Ibero-America: Developments and research perspectives&quot;, Valentina Gutiérrez, Universidad del Valle, Colombia</td>
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<td>Dec 15</td>
<td>17:30</td>
<td>Aula Magna</td>
<td>Plenary session - &quot;A stochastic programming approach for the operational fleet composition problem&quot;, Ramon Faganello Fachini and Camila Fernanda Contreras, Shipping OR Team, Mercado Libre, Argentina + Brazil + Chile</td>
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<td>Dec 15</td>
<td>18:30</td>
<td>Aula Magna</td>
<td>Closing ceremony</td>
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# CLAIO 2022

XXI Latin-Iberoamerican Conference on Operations Research  
Buenos Aires, Argentina - December 12-15, 2022  
Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires

## CLAIO 2022 detailed program

### Parallel session - Ibero-American Network on Multicriteria Evaluation and Decision (RED-M)  
December 12, 2022 (Monday), 09:00 - 10:40 - Room 1101  
Chair: Javier Pereira

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
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<tbody>
<tr>
<td>09:00</td>
<td>Selection of investment portfolio using the ELECTRE III method</td>
<td>Claudia Peretto, Leticia Tolosa, Tomas Barbaroy, María Gracia Frascaroli</td>
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<td>09:25</td>
<td>Prioritization of FICs considering multiple criteria for efficient portfolios</td>
<td>Eduar Fernando Aguirre Gonzalez, Pablo Cesar Manyoma Velasquez, Diego Fernando Manotas Duque</td>
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<tr>
<td>09:50</td>
<td>Multi-criteria hesitant sorting of projects in a Brazilian electrical power company</td>
<td>Javier Pereira, Elaine Oliveira, Danielle Morais, Luciana Alencar, Ana Paula Costa</td>
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<td>10:15</td>
<td>Management team classification by competencies: A case study in the civil construction sector</td>
<td>Camila Campos Gómez Famá, Luciana Hazin Alencar, Joseph Hakkinen Alves Santos</td>
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### Parallel session - Network design  
December 12, 2022 (Monday), 09:00 - 10:15 - Room 1208  
Chair: María de los Milagros Verrengia

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<tr>
<th>Time</th>
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<tr>
<td>09:00</td>
<td>Network design through a multi-level location and inventory model with multiple products, multiple periods and delivery times in the network.</td>
<td>Javier Arias-Osorio, Carlos Poches, Natalia Tarazona</td>
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<tr>
<td>09:25</td>
<td>Elevator and bikeways network design problem considering user preferences</td>
<td>Pablo Torrealba-Gonzalez, German Paredes-Belmar, Gabriel Gutiérrez-Jarpa</td>
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<td>09:50</td>
<td>Analysis of Argentine’s railway infrastructure in the soybean supply chain operation</td>
<td>Milagros Verrengia, Aldo Vecchietti</td>
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</table>
CLAIO 2022 detailed program

Parallel session - OR in Healthcare I
December 12, 2022 (Monday), 09:00 - 10:40 - Room 1209
Chair: Fernanda Suazo Morales

09:00  Daniela Cantane, Juliana Freitas, Helenice Florentino Silva, Thalita Obal, Comparison of radiotherapy planning optimization models including dose-volume constraints

09:25  Camilo Velez, Doris Campo, Lilian Sepulveda, Análisis de estrategias para el control del patosistema Diaphorina citri - HLB

09:50  Doris Campo, Lilian Sepulveda, Modelo matemático para el manejo óptimo del Psílido Diaphorina Citri

10:15  Fernanda Suazo-Morales, Óscar C. Vásquez, Modelo matemático para estimar la distribución del índice de masa corporal (IMC) en la población adulta chilena.

Parallel session - VRP I
December 12, 2022 (Monday), 09:00 - 10:40 - Room 1301
Chair: Pablo Rey

09:00  Juan G. Villegas R., Juan Carlos Rivera, Periodic vehicle routing with consistency and synchronization constraints: formulation and solution methods

09:25  Maddlen Benedicto Villagra Aguayo, Carlos Obreque Niñez, Guillermo Latorre Núñez, Patricio Álvarez Mendoza, Barrales Araneda Alex, Carlos Bizama Fica, El problema del ruteo de furgones escolares selectivo, con carga mixta, flota heterogénea y ventanas de tiempo

09:50  Carlos Obreque, Guillermo Latorre-Núñez, Patricio Álvarez, Alex Barrales, Carlos Bizama, Maddlen Benedicto Villagra Aguayo, Ruteo de furgones escolares selectivo, con carga mixta, flota homogénea y transbordo

10:15  Luis Yáñez-Sandivari, Cristián Cortés, Pablo Rey, Optimizing vehicle routing problems with material convergence and deprivation costs in multi-dimensional representation network

Parallel session - Stochastic optimization I
December 12, 2022 (Monday), 09:00 - 10:40 - Room 1302
Chair: Alejandro Mac Cawley

09:00  Juan Borrero, Denis Sauré, Natalia Trigo, Optimal sequential stochastic shortest path interdiction

09:25  Luis San Martin, Jorge Vera, Capability design for a modular block-based organization via robust optimization

09:50  José Emmanuel Gomez-Rocha, Eva Selene Hernández-Gress, A multi-product aggregate production planning using stochastic programming: case study in a furniture company

10:15  Alejandro Milani, Alejandro Mac Cawley, Analyzing the impact of beliefs errors in the planning of wine grape harvesting operations
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Parallel session - Combinatorial optimization I
December 12, 2022 (Monday), 09:00 - 10:40 - Room 1303
Chair: John Andrés Muñoz Guevara

09:00 Alberto de Paula Silva, Mercedes Bustos Díaz, Proposal of a model for optimizing the project portfolio of the Brazilian National Institute for Space Research

09:25 Gabriel Solari, Review and contribution in the MTZ formulation for the Traveling Salesman Problem

09:50 Karen García-Vásquez, Carlos Contreras-Bolton, Rodrigo Linfati, Un Modelo matemático y una metaheurística para una nueva variante del Pollution Traveling Salesman Problem

10:15 John Andres Muñoz Guevara, Exact models for a robotics assembly cell scheduling problem to minimize tardiness

Parallel session - Algorithms I
December 12, 2022 (Monday), 09:00 - 10:40 - Room 1304
Chair: Amanda Ferreira de Azevedo

09:00 Daniel Mauricio Ocampo-Giraldo, Ana Maria Anaya-Arenas, Claudio Contardo, A dynamic discretization discovery algorithm for the routing of multiple and highly perishable commodities: an application to the transportation of biomedical samples

09:25 Simon B. Hengeveld, Antonio Mucherino, An error-tolerant branch-and-prune algorithm for distance geometry

09:50 Michal Cerny, Robust linear regression and minimization of Jaeckel's dispersion via the ellipsoid method with oracles

10:15 Amanda Ferreira de Azevedo, Victor Hugo Rodrigues Do Nascimento, Abilio Pereira de Lucena Filho, An uncapacitated facility location approach for finding optimal diameter constrained minimum spanning trees with diameter no larger than four

Parallel session - Applications of OR I
December 12, 2022 (Monday), 09:00 - 10:40 - Room 1305
Chair: Josué Salinas

09:00 Fabio M. Miguel, Diego G. Rossit, Mariano Frutos, Antonella Cavallin, An application of data mining to build the OD matrix in developing countries: An Argentinean case study

09:25 Gian Franco Lancioni, Guillermo Duran, Statistical modelling of tennis results prediction

09:50 Richard Weber, Ignacio Carvajal, Fernando Crespo, Ramiro Saltos, A new validity index for dynamic clustering

10:15 Josué Salinas, Jaime Miranda, Sistema de apoyo a la toma de decisiones para el pronóstico de rating televisivo
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Parallel session - Machine Learning and DEA
December 12, 2022 (Monday), 09:00 - 10:15 - Room 1306
Chair: Lívia Mariana Lopes de Souza Torres

09:00  Sebastián Maldonado, Catalina Sánchez, Carla Vairetti, Modelos predictivos de cobranza basados en aprendizaje de máquinas tradicional y causal
09:25  Tatiana Andrea Castillo Jaimes, Andres Weintraub, Jaime Carrasco, Diseño de paisajes resistentes a incendios usando Reinforcement Learning
09:50  Lívia Mariana Lopes de Torres, Francisco de Sousa Ramos, A common weight multi-layer DEA composite indicator to assess the quality of undergraduate courses in Brazil

Parallel session - OR in Energy I
December 12, 2022 (Monday), 09:00 - 10:15 - Room 1307
Chair: Larraitz Aranburu Laka

09:00  Sebastián Taboh, Isabel Mendez-Diaz, Paula Zabala, Intelligent exploration of a backtracking algorithm for scheduling residential load
09:25  Alexandra Valencia, Yris Olaya, Santiago Arango, Simulación de los efectos de la penetración de tecnologías renovables no convencionales en la seguridad energética en Colombia
09:50  Larraitz Aranburu, Aitziber Unzueta, M. Araceli Garín, Juan I. Modroño, Aitor Amezua, Técnicas de análisis y optimización para la identificación de línea en las redes de distribución inteligentes mediante datos metrológicos

Parallel session - Special session honoring Jayme Szwarcfiter I
December 12, 2022 (Monday), 09:00 - 10:40 - Room 1309
Chair: Rosiane de Freitas

09:00  Celina Figueiredo, Alexsander Melo, Fabiano Oliveira, Ana Silva, MaxCut is hard when restricted to geometric intersection model graph classes
09:25  Erika Morais Martins Coelho, Hebert Coelho Da Silva, Luerbio Faria, Mateus de Paula Ferreira, Sulamita Klein, The time complexity of oriented chromatic number for subgraphs of grids
09:50  Rosiane de Freitas, Contributions in channel assignment and distance geometry with Nelson Maculan
10:15  Rosiane de Freitas, Contributions in scheduling theory and distance-constrained graph colorings with Jayme Szwarcfiter
CLAIO 2022 detailed program

Opening ceremony + Plenary session - "CRIAB: Conflicts, risks and impacts associated with dams", Mario Martínez, Universidade Estadual de Campinas, Brazil
December 12, 2022 (Monday), 11:10 - Aula Magna
Chair: Pablo Rey

The CRIAB working group was created in 2019 as a result of the disaster in Brumadinho, Minas Gerais, where a tailings dam collapsed causing huge human and material losses. Since then, the group has been working in an interdisciplinary context on risk assessment, environmental remediation, support to affected populations and hydraulic modeling. In this talk we will transmit the experiences of the Mathematical Engineering subgroup in the development of models, with emphasis on appropriate numerical analysis and optimization tools.

The talk will be given in Spanish, with slides in English.

Parallel session - Ibero-American Network on Multicriteria Evaluation and Decision (RED-M) - Talk: "Métodos de Estruturação de Problemas para Modelos Multicritério de Apoio à Decisão", Mischel Carmen Neyra Belderrain, Instituto Tecnológico de Aeronáutica - ITA, Brasil
December 12, 2022 (Monday), 14:00 - Room 1101
Chair: Luciana Alencar

Parallel session - OR in Energy II
December 12, 2022 (Monday), 14:00 - 15:40 - Room 1208
Chair: Santiago Arango-Aramburo

14:00 Rafael Benchimol Klausner, Bernardo Freitas Paulo da Costa, Joaquim Dias Garcia, Optimal bidding strategies in Energy Markets

14:25 Tito Homem-De-Mello, Frédéric Babonneau, Constanza Zavala, Impact of climate change on long-term energy generation and demand in Chile


15:15 Santiago Arango-Aramburo, Yris Olaya, Verónica Valencia, The role of alternative combustion vehicles and the modal changes on the path to decarbonizing road transport
Parallel session - Scheduling I
December 12, 2022 (Monday), 14:00 - 15:40 - Room 1209
Chair: Juan Pablo Rosas Baldazo

14:00  Matias Villafranca, Felipe Delgado, Mathias Klapp, A stochastic programming approach for airline maintenance scheduling under uncertainty

14:25  Joan Cusimano, Romina Alejandro Rios, Fernando Herrero, Emilce Faba, Pablo Andrès Marchetti, Formulación MILP y aplicación de algoritmo de horizonte rodante para la Programación Maestra de la Producción en una industria de alimentos para mascotas

14:50  Joaquin Velázquez, Héctor Cancela, Pedro Piñeyro, Planificación de la producción con máquinas paralelas multi-producto, recursos compartidos y tiempos de configuración dependientes de la secuencia

15:15  Pablo Rosas, Yasmin Rios-Solis, Romeo Sánchez Nigenda, A personalized activity scheduling problem considering stress, deadlines, and teamwork

Parallel session - Simulation I
December 12, 2022 (Monday), 14:00 - 15:40 - Room 1301
Chair: Pepa Ramirez Cobo

14:00  Rodrigo Mahaluf, Jaime Carrasco, Fulgencio Lisón, Cristobal Pais, Andrés Weintraub, Combining optimization and fire simulation modeling to protect ecological values at landscape scale

14:25  Gabriela Alfaro, Jaime Carrasco, Andres Weintraub, Alejandro Miranda, Cristobal Pais, Riesgo de incendios forestales en el interfaz urbano rural de Concepción, usando machine learning y simulación espacial

14:50  M. Elena Martínez-Manzanares, J. Adolfo Minjárez-Sosa, Mean field semi-Markov control models for interacting objects systems under a discounted optimality criterion

15:15  Pepa Ramirez Cobo, Rosa Lillo, Marcos Gonzalez Bernal, Stochastic modeling of modern call center data via Markovian arrival processes

Parallel session - VRP II
December 12, 2022 (Monday), 14:00 - 15:40 - Room 1302
Chair: Laura Davila-Pena

14:00  Hernán Lespay, Karol Suchan, Territory design for Multi-Period Vehicle Routing Problem with Time Windows

14:25  Igor E. S. Melo, Raphael Kramer, A heuristic algorithm for solving the school bus routing problem with multiple periods

14:50  Cristian G Gómez-Marín, Conrado A Serna-Uran, A multi-agent architecture for solving the dynamic vehicle routing problem with time windows

15:15  Laura Davila Pena, David Rodríguez Penas, Balbina Casas Méndez, Maria Antónia Carravilla, José Fernando Oliveira, Two-phase heuristics for the novel multi-compartment truck and trailer routing problem
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Parallel session - Agriculture and Machine Learning
December 12, 2022 (Monday), 14:00 - 15:40 - Room 1303
Chair: Víctor Manuel Albornoz Sanhueza

14:00  Víctor Bucarey, Decision-focused learning under the lens of bilevel programming

14:25  Nicolás Reyes-Reyes, Marcela González-Araya, Vladimír Soto-Silva, Javier Gómez-Lagos, Irlanda Ceballos-Fuentealba, Identificación de variedad y etapas de crecimiento en cultivos mediante redes neuronales y descriptores de características: Un caso aplicado en un cultivo de lechugas en Chile

14:50  Irlanda Ceballos-Fuentealba, Javier Gómez-Lagos, Marcela González-Araya, Vladimír Soto-Silva, Nicolás Reyes-Reyes, Un enfoque de machine learning para la estimación de pérdida hortícola: un caso aplicado en un cultivo de lechugas en Chile

15:15  Víctor M Albornoz, Patricio I Vera, Lia C Araneda, A two-stage stochastic bilevel program for coordinating a hierarchical fresh food supply chain

Parallel session - Forestry
December 12, 2022 (Monday), 14:00 - 15:40 - Room 1304
Chair: Daniel Rossit

14:00  Frank Piedra-Jimenez, Diego Broz, Juan M. Novas, Maria Analia Rodriguez, A multi-objective mathematical optimization approach for the forest planning problem

14:25  David Palacios, Jaime Carrasco, Sebastián Dávila, Cristobal Pais, Maximiliano Martinez, Andrés Weintraub, Comparison of metaheuristics for the optimization of the firebreak allocation in real landscapes

14:50  Karina López, Victor Viana, Pedro Piñeyro, Optimización de las operaciones forestales con consideraciones medioambientales: una aplicación a un aserradero de Uruguay

15:15  Daniel Rossit, Diego Broz, Cristóbal Pais, Andrés Weintraub, Foresty harvest planning considering social impacts and soil compaction issues

Parallel session - Logistics I
December 12, 2022 (Monday), 14:00 - 15:15 - Room 1305
Chair: Luis Marcelo Ascencio Carreño

14:00  Rajan Batta, Nastaran Oladzad-Abbasabady, Using prize-collection concepts to solve time-limited search problems: Application to humanitarian operations

14:25  Mahsa Hosseini, Joseph Milner, Gonzalo Romero, Dynamic relocations in car-sharing networks

14:50  Macarena Vergara, Felipe I. Díaz, Luis M. Ascencio, Sergio Cruz, Rosa G. Gonzalez Ramirez, J. René Villalobos, Metodología basada en Costos Logísticos Totales para el análisis estratégico del Corredor Bioceánico Capricornio y su impacto en los puertos del norte de Chile
CLAIO 2022 detailed program

Parallel session - Timetabling
December 12, 2022 (Monday), 14:00 - 15:15 - Room 1306
Chair: Julián Andrés Osorio Vergara

14:00  Jaime Miranda, A analytical approach for infrastructure capacity planning in higher education
14:25  Jainet Bernal, Valentina Rodríguez, Catalina Martínez, Modelo matemático para nivelar la carga estudiantil, en las distintas franjas horarias de IES, y favorecer el distanciamiento social; caso de estudio, Universidad Central en Bogotá Colombia
14:50  Julian Osorio, Mauricio Cepeda, Jainet Bernal, Asignación de árbitros en campeonatos de fútbol multisede usando un modelo de optimización multiobjetivo. Caso de estudio Copa América

Parallel session - Nonlinear optimization
December 12, 2022 (Monday), 14:00 - 15:40 - Room 1307
Chair: Jan-Joachim Rückmann

14:00  Silvia Maria Simões de Carvalho, Aurelio Oliveira, Application of the Quasi-Netwon in interior point methods for solving the predispatch problem
14:25  Renan W. Prado, Sandra A. Santos, Lucas E. A. Simões, On the achievement of the complementary approximate Karush-Kuhn-Tucker conditions and algorithmic applications
14:50  Marko Rojas-Medar, Lucelina dos Santos, Adson Melo, María Beatriz Hernández-Jiménez, Nonregular multiobjective problems: Necessary and sufficient optimality conditions
15:15  Jan-J. Ruckmann, Daniel Hernandez Escobar, On strong stability of C-stationary points for MPCC

Parallel session - OR in Economy I
December 12, 2022 (Monday), 14:00 - 15:40 - Room 1308
Chair: Jonathan Lozano Oviedo

14:00  Xavier Brusset, Hussein Naseraldin, Aseem Kinra, Rami Alkhudary, Increasing willingness to pay in the food supply chain: a Blockchain approach
14:25  André Salles, Dayana Alves, Performance of risk and return on ESG financial assets in international markets: A preliminary analysis
14:50  Fabien Gensbittel, Dana Maria Pizarro, Jerome Renault, Competition and recall in selection problems
15:15  Jonathan Lozano Oviedo, Cristian Cortés Carrillo, Pablo Andres Rey, Modelo de optimización multiobjetivo para un caso genérico de una cadena de suministro de bucle cerrado considerando elementos de sostenibilidad y economía circular
CLAIO 2022 detailed program

Parallel session - Multi-criteria optimization
December 12, 2022 (Monday), 14:00 - 15:40 - Room 1309
Chair: Douglas Alem

14:00  Armando Meza, Juan Pérez, Héctor López-Ospina, Luís Quezada, Development of strategic map (BSC) with fuzzy logic and multi-criteria optimization
14:25  Mauricio Moyano, Carolina Lagos, Guillermo Cabrera-Guerrero, Pareto local search for direct aperture optimisation on IMRT
14:50  Letícia Maria de Melo Silva Cheloni, Rodrigo de Carvalho, André L. Maravilha, Érica Linhares Reis, A multi-objective algorithm based on decomposition for optimal design Manganese briquettes
15:15  Douglas Alem, Aakil Caunhye, Equitable location-allocation driven by socioeconomic concerns

Plenary session - Legends of OR I: Celebrating Andrés Weintraub and Hugo Scolnik
December 12, 2022 (Monday), 16:10 - Aula Magna
Chair: Isabel Méndez-Díaz

In this session we will be honoring Andrés Weintraub (Universidad de Chile, Chile) and Hugo Scolnik (Universidad de Buenos Aires, Argentina) for their lifelong achievements and their contributions to shaping the OR community in Latin America. Rafael Epstein (Universidad de Chile, Chile) will give a talk on the academic life of Andrés Weintraub, whereas José Mario Martínez (Universidade Estadual de Campinas, Brazil) will give a talk on Hugo Scolnik’s achievements. On behalf of the Latin-Iberoamerican Association of Operations Research Societies (ALIO), Antonio Alonso-Ayuso will present Andrés Weintraub and Hugo Scolnik a special award.

Plenary session - Legends of OR II: Celebrating Jayme Szwarcfiter and Nelson Maculan
December 12, 2022 (Monday), 17:20 - Aula Magna
Chair: Isabel Méndez-Díaz

In this session we will be honoring Jayme Szwarcfiter (Universidade Federal do Rio de Janeiro, Brazil) and Nelson Maculan (Universidade Federal do Rio de Janeiro, Brazil) for their outstanding academic careers and their pioneering work in graph theory and OR, respectively, in our region and in Brazil in particular. Celina de Figueiredo (Universidade Federal do Rio de Janeiro, Brazil) will give a presentation on Jayme Szwarcfiter, and Rosiane de Freitas (Universidade Federal do Amazonas, Brazil) will give a talk on Nelson Maculan, on behalf of their respective academic families. Antonio Alonso-Ayuso, president of ALIO, will present Jayme Szwarcfiter and Nelson Maculan a special award from ALIO.
In this panel, our special guests Andrés Weintraub (Universidad de Chile, Chile), Hugo Scolnik (Universidad de Buenos Aires, Argentina), Nelson Maculan (Universidade Federal do Rio de Janeiro, Brazil), and Jayme Szwarcfiter (Universidade Federal do Rio de Janeiro, Brazil) will reflect on the origins of OR in Latin America, the origin of the Latin-Iberoamerican Association of Operations Research Societies (ALIO), and the current status and future perspectives of our field.
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Parallel session - Ibero-American Network on Multicriteria Evaluation and Decision (RED-M) - Minicourse: "Método FITRADEOFF (The Flexible and Interactive Tradeoff)", Luciana Alencar, Maria Elvira Pessoa, Eduarda Asfora Frej, Universidade Federal de Pernambuco, Brazil
December 13, 2022 (Tuesday), 09:00 - Room 1101
Chair: Luciana Hazim

Parallel session - Stochastic optimization II
December 13, 2022 (Tuesday), 09:00 - 10:40 - Room 1208
Chair: Carlos Ernani Fries

09:00 Enrique Fernández, Javier Marenco, Heuristic algorithms for a stochastic optimization problem in production and distribution planning
09:25 Douglas Nascimento, Adriana Cherri, José Oliveira, Beatriz Oliveira, Stochastic model for the two-dimensional cutting stock problem: usable leftovers and uncertainty in demand
09:50 Iago Leal de Freitas, Bernardo Freitas Paulo da Costa, Non-convexity measures with applications to improve the convergence of stochastic dual dynamic programming
10:15 Carlos Ernani Fries, Luigi Gianni, Application of Constraint Programming to the sequencing of non-identical parallel machines with sequence-dependent setup and stochastic availability

Parallel session - OR in Economy II
December 13, 2022 (Tuesday), 09:00 - 10:40 - Room 1209
Chair: Gabriel Weintraub

09:00 Ivan Mauricio Bermudez Vera, Jaime Mosquera Restrepo, Diego Fernando Manotas Duque, Evaluation of the probability of default in a solidarity economy entity with a low default rate using Data Mining
09:25 Hamed Amini, Fire sales and default cascades in complex financial networks
09:50 Olivares Marcelo, Monitoring performance, organizational culture, and the efficiency of public procurement
Parallel session - OR in Energy III  
December 13, 2022 (Tuesday), 09:00 - 10:15 - Room 1301  
Chair: Vinicius Jacques Garcia

09:00  Angelica M. Gonzalez O., Leonardo Rivera Cadavid, Diego Manotas Duque, Prioritization model for the installation of electric Microgrids
09:25  Tales Moreira Tavares, Christiano Lyra Filho, Optimal allocation of battery and switches in distribution networks to improve reliability

Parallel session - VRP III  
December 13, 2022 (Tuesday), 09:00 - 10:40 - Room 1302  
Chair: Conrado Augusto Serna Uran

09:00  Alan Osorio-Mora, John Wilmer Escobar, Paolo Toth, A two-phase metaheuristic for solving the multi-depot cumulative capacitated vehicle routing problem
09:25  Débora P. Ronconi, João L.V. Manguino, Vehicle routing with time windows and step cost functions: metaheuristic approaches
09:50  Michell Queiroz, Kenneth Sörensen, Multi-depot heterogeneous on-demand bus routing problem
10:15  Conrado Augusto Serna Uran, Cristian Giovanny Gomez Marín, Agent-based genetic algorithm for solving the multi-depot vehicle routing problem

Parallel session - OR and statistics I  
December 13, 2022 (Tuesday), 09:00 - 10:40 - Room 1303  
Chair: Julián E. Tornillo

09:00  Manuel Cepeda, Pedro Toledo, Factor de corrección para disminuir el sesgo generado por diferencias de criterio de los evaluadores en la postulación a fondos concursables
09:25  Pablo Galaz, Sebastián Mena, Denis Sauré, Bayesian inference of a Markovian model of soccer with application in scouting
09:50  Fredy Troncoso, Richard Weber, Finding Criminal Groups in Suspect Networks
10:15  Pablo B. Savian, Julián E. Tornillo, Guadalupe Pascual, Andres Redchuk, Aplicación de ciencia de datos en patrones de consumo post-pandemia: estudio del caso e-commerce
CLAIO 2022 detailed program

Parallel session - OR in Healthcare II
December 13, 2022 (Tuesday), 09:00 - 10:40 - Room 1304
Chair: S. Raghavan

09:00  Helenice Florentino, Claudia Pio Ferreira, Antone Benedito, Wolbachia-based biocontrol for dengue reduction

09:25  Leonardo Neves, Marcos Negreiros, Bruno Chaves, A space-temporal clustering methodology for Dengue prevention in Fortaleza/CE

09:50  Valeria Scapini, Javiera Nuñez, Ramiro Moreno, Incendios forestales y enfermedades respiratorias en la región del Biobío, Chile

10:15  Shubham Akshat, S. Raghavan, A continuous scoring model for fair liver transplant allocation

Parallel session - Inventory and supply chain optimization
December 13, 2022 (Tuesday), 09:00 - 10:40 - Room 1305
Chair: Richard Riffo

09:00  Victoria G. Achkar, Braulio B. Brunaud, Rami Musa, Ignacio E. Grossmann, Extensions to the guaranteed-service model for safety stock placement in industrial practice

09:25  Mario Ramirez, Enrique Simpson, Pablo Escalona, Enfoque temporal para controlar la escasez en sistemas de inventario

09:50  Francisco J. Tapia-Ubeda, Pablo A. Miranda, Gabriel Gutiérrez-Jarpa, Supply chain network design integrating supplier selection decisions

10:15  Richard Riffo, Carlos Obreque, Guillermo Latorre, Patricio Álvarez, Alex Barrales, Carlos Bizama, El problema del ruteo de un furgón escolar, generalizado, selectivo, con carga mixta y ventanas de tiempo

Parallel session - Machine Learning I
December 13, 2022 (Tuesday), 09:00 - 10:40 - Room 1306
Chair: Julián Andrés Castillo Grisales

09:00  Miguel Alfaro, Manuel Vargas, Dali Grado, Jorge Zamorano, Natalia Karstegl, Forecasting time series COVID 19 using deep learning methods: South America comparative case study

09:25  José-Miguel Rubio, Juan José Gutiérrez Terraza, Sebastián Ríos, Optimización del rendimiento de redes móviles utilizando técnicas de aprendizaje automático

09:50  Carla Marina Vairetti, Sebastian Maldonado, Re-etiquetado de categorías en informes de delitos criminales a través de análisis de texto y aprendizaje profundo

10:15  Julian Andres Castillo, Yony Fernando Ceballos, Juan Pablo Barrero Velez, Un modelo híbrido de Machine Learning con Web Scraping para determinar la dinámica urbana de las construcciones de Medellín - Colombia
CLAIO 2022 detailed program

Parallel session - Applications of OR II
December 13, 2022 (Tuesday), 09:00 - 10:40 - Room 1307
Chair: Francisco Jose Mario Vilches Fuentes

09:00  Agüero-Tobar Magdiel, Marcela González-Araya, Rosa G. González Ramírez, Luis M. Ascencio, Análisis de Eficiencia para los puertos ubicados en el Corredor Biocéánico Capricornio basado en la metodología de Análisis Envolvente de Datos

09:25  Oscar Mauricio Cepeda Valero, Jose Fidel Torres Delgado, Luis Felipe Jimenez Sanchez, Andres Bernardo Ocampo Melo, A Stackelberg model for transport infrastructure planning

09:50  Juan Pablo Cavada, Cristián E. Cortés, Pablo A Rey, A model-based predictive control strategy for minimizing relocations in inland logistic terminals

10:15  Francisco Vilches, Cristián E. Cortés, Andrés Fielbaum, Sistema ridesharing con puntos de pickup/drop off y jerarquización de nodos

Parallel session - Mixed Integer Programming I
December 13, 2022 (Tuesday), 09:00 - 10:15 - Room 1308
Chair: Hector D. Perez

09:00  José Costa, Gabriel Sousa, Manoel Campêlo, Exact methods for the Minimum Spanning k-Forest Problem

09:25  Salvador J. Vicencio-Medina, Yasmín A. Ríos-Solís, Nestor M. Cid-García, MILP + Metaheuristic: A matheuristic for the maximal covering location problem with accessibility indicators and mobile units

09:50  Héctor Pérez, Ignacio Grossmann, Extending generalized disjunctive programming to model hierarchical systems

Parallel session - Special session honoring Nelson Maculan I
December 13, 2022 (Tuesday), 09:00 - 10:40 - Room 1309
Chair: Julio Cesar Lopez Luis

09:00  Ernesto G. Birgin, Coverings with minimum radius identical balls

09:25  Rafael Andrade, Rommel Saraiva, Emanuel Elias Silva Castelo, Valid inequalities and a new integer programming model for the k-color shortest path problem

09:50  Rafael Andrade, Adriano Freitas, Improved solution strategies for the spanning tree problem with variable node degree

10:15  Julio Lopez, Miguel Carrasco, Sebastián Maldonado, Regularized version of the minimax probability machine
CLAIO 2022 detailed program

Plenary session - "Human migration networks: How Operations Research can assist with refugees and supply chain labor shortages," Anna Nagurney (IFORS Distinguished Lecturer), University of Massachusetts, USA
December 13, 2022 (Tuesday), 11:10 - Aula Magna
Chair: Paula Zabala

Humans throughout history have sought locations with better opportunities, amenities, greater safety, etc., for themselves and their families. With global challenges such as: climate change, economic hardship, the COVID-19 pandemic, and geopolitical strife and wars, the migration of humans across space and time is increasing, causing pressures on governments and different societies to respond and act. In this presentation, I will provide an overview of our multidisciplinary work on human migration networks using various methodologies drawn from Operations Research. I will reveal how Operations Research can assist in policy-making in this important domain from the prediction and management of refugee flows to investing in and attracting international migrant labor for the alleviation of labor shortages in a plethora of supply chains.

Parallel session - Ibero-American Network on Multicriteria Evaluation and Decision (RED-M)
December 13, 2022 (Tuesday), 12:30 - 13:45 - Room 1101
Chair: Luciana Alencar

12:30 Maria E. B. T. Pessoa, Eduarda A. Frej, Adiel T. de Almeida, An application of the FITradeoff method for ranking problematic in a problem related to the retail sector
12:55 Ciro Corrêa Vieira de Melo, Jônatas Araújo de Almeida, A multicriteria decision model based on FITradeoff Method for prioritizing police officers to participate in a special operation
13:20 Ana Carolina Silva, Luciana Alencar, A BIM implementation actions prioritization model in AEC organizations

Parallel session - Supply chain optimization I
December 13, 2022 (Tuesday), 12:30 - 14:10 - Room 1208
Chair: Luis Olivares Alvarez

12:30 Ignacio Castañeda, Andrea Teresa Espinoza Pérez, Cadena de suministro para la valorización de neumáticos fuera de uso desde un enfoque ambiental: Una aproximación desde la optimización
12:55 Andrea Teresa Espinoza Pérez, Óscar C. Vásquez, Representando la sostenibilidad en el diseño óptimo de una cadena de suministro: Una propuesta integrada y reducida a partir de la revisión de la literatura
13:20 Nicolas Vanzetti, Gabriela Corsano, Jorge M. Montagna, An appropriate assessment of the supply chain performance considering different indicators
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## Parallel session - Machine Learning II

December 13, 2022 (Tuesday), 12:30 - 14:10 - Room 1209  
Chair: Jasone Ramírez-Ayerbe

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<tr>
<th>Time</th>
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<tr>
<td>12:30</td>
<td>Irma Noemi No, Julián E. Tornillo, Guadalupe Pascal, Leandro Rabbione, Mobile traceability as a machine learning resource in predictive modeling of inland transport fuel demand</td>
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<td>12:55</td>
<td>Angel Ruiz, Ana Maria Anaya-Arenas, Julia Isabel Serrato, Implementation of a Machine Learning tool for automatizing abstract screening in literature reviews</td>
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<td>13:20</td>
<td>Marcel Goic, Nicolás Aramayo, Mario Schiappacasse, A multi-armed Bandit Approach for house ads recommendations</td>
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<td>13:45</td>
<td>Jasone Ramírez-Ayerbe, Emilio Carrizosa, Dolores Romero Morales, One-to-one and many-to-one Counterfactual Explanations for score-based models</td>
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## Parallel session - Lot sizing

December 13, 2022 (Tuesday), 12:30 - 14:10 - Room 1301  
Chair: Andrés Vallecilla

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<tbody>
<tr>
<td>12:30</td>
<td>Fernanda Ueno, Marcos Furlan, Maristela Santos, MIP-Heuristics for the multi-level capacitated lot sizing problem</td>
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<tr>
<td>12:55</td>
<td>Lucas Gana Reyes, Franco Quezada, Sebastián Dávila, The economic lot sizing problem with remanufacturing and lost sales : complexity analysis and algorithms</td>
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<tr>
<td>13:45</td>
<td>Fernando Islas, Pedro Piñeyro, Carlos E. Testuri, Analysis of the lot-sizing problem with remanufacturing and uncertainty in demand and returns</td>
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## Parallel session - OR in Energy IV

December 13, 2022 (Tuesday), 12:30 - 14:10 - Room 1302  
Chair: Juan Pablo Orejuela Cabrera

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<th>Time</th>
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<tbody>
<tr>
<td>12:30</td>
<td>Salomé Rodriguez, Diego Broz, Luis Zeballos, Rodolfo Dondo, Simultaneous optimization of the supply chain configuration and material flows for cogeneration of electrical and thermal energy from forest biomass.</td>
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<tr>
<td>12:55</td>
<td>Enrique Gabriel Baquela, Ana Carolina Olivera, Multi-objective math-heuristic for optimizing the location of electric-scooter sharing-stations</td>
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<tr>
<td>13:20</td>
<td>Orlando Joaqui-Barandica, Diego Fernando Manotas-Duque, Jorge M. Uribe, Decision tools from index fund finance to explore the path towards a scenario of renewable energy generation with globalization and high specialization of regional electricity markets</td>
</tr>
<tr>
<td>13:45</td>
<td>Yovany Arley Erazo Cifuentes, Juan Pablo Orejuela Cabrera, Diego Fernando Manotas Duque, Economic comparison of alternatives for the production, storage, and transportation of renewable hydrogen in Colombia</td>
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</tbody>
</table>
Parallel session - Algorithms II
December 13, 2022 (Tuesday), 12:30 - 14:10 - Room 1303
Chair: Juan CamiloYepes Borrero

12:30 Vinicius Gusmão Pereira de Sá, Judismar Arpini Junior, Cuckoo Hashing with perfect rehash

12:55 Eleazar Madriz, Camilo Rocha, Nelson Maculan, Mauricio Romero, A pseudo polynomial algorithm for optimizing a linear function at the intersection of the closed ball and integer lattice in the n-dimension space


13:45 Juan Camilo Yepes Borrero, Federico Perea, Fulgencia Villa, Eva Vallada, Flowshop with additional resources during setups: mathematical models and a GRASP algorithm

Parallel session - OR in Agriculture I
December 13, 2022 (Tuesday), 12:30 - 14:10 - Room 1304
Chair: Jorge Luis Recalde Ramírez

12:30 Myriam Gaete, Marcela González-Araya, Análisis comparativo de técnicas de minería de datos para la estimación de precio de fruta de exportación: Caso de estudio en una empresa exportadora chilena

12:55 Fernando L. Garagorry, Moacir Pedroso Junior, Power indices of game theory and agricultural land use in Brazil

13:20 María Margarita López de Recalde, Jorge Vera, Lluís Miquel Plà Aragonés, Jorge L. Recalde-Ramírez, Agricultural operations planning addressing sustainability: a case study for family farmers in Paraguay

13:45 Jorge L. Recalde-Ramírez, Jorge Vera, Lluís Miquel Plà Aragonés, María Margarita López de Recalde, A mathematical programming model for the logistic design of an agricultural network and rural schools.
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Parallel session - OR for COVID-19
December 13, 2022 (Tuesday), 12:30 - 14:10 - Room 1305
Chair: Isidro Soria Arguello


12:55 Federico Corral Marchant, Eric Forcael Durán, Rodrigo Linfati, Evaluación de la programación laboral a través de un modelo de optimización multiobjetivo en el contexto de la pandemia COVID-19

13:20 Sannie Román, Betania Echagüe, Jorge L. Recalde-Ramírez, María Margarita López de Recalde, Mathematical programming application for the assignment of patients, with Covid-19, to ICU beds

13:45 Isidro Soria Arguello, Rafael Torres Escobar, Hugo Perez, Tomas Guillermo Perea Rivera, A proposal mathematical model for the vaccines COVID-19 distribution network: A case study in Mexico

Parallel session - Special session honoring Nelson Maculan II
December 13, 2022 (Tuesday), 12:30 - 14:10 - Room 1306
Chair: Jon Lee

12:30 Jon Lee, Luze Xu, On perspectivization of convex functions over polytopes

12:55 Marcos José, Nelson Maculan, The Periodic Capacitated Centred Clustering Problem

13:20 Erik Alex Papa Quiroz, Nancy Baygorrea, Nelson Maculan, Convergence, rate of convergence and finite termination of inexact proximal point methods for multiobjective quasiconvex minimization on Hadamard manifolds


Parallel session - Applications of OR III
December 13, 2022 (Tuesday), 12:30 - 14:10 - Room 1307
Chair: Natalia Paz González González

12:30 Maycon Souza, Aurelio Oliveira, Double splitting preconditioner: A new class of preconditioners


13:20 Doris Campo, Lilian Sepulveda, Edwin Barrios, Modelo compartimental de tuberculosis con tratamiento en individuos latentes

13:45 Natalia Paz González González, Cristián E. Cortés, Pablo A. Rey, Un problema de ruteo de vehículos periódico en la gestión de residuos industriales
CLAIO 2022 detailed program

Parallel session - Special session honoring Jayme Szwarcfiter II
December 13, 2022 (Tuesday), 12:30 - 14:10 - Room 1309
Chair: Lia Alessandra da Silva Martins

12:30  Guilherme C. M. Gomes, Bruno P. Masquio, Paulo E. D. Pinto, Vinicius F. dos Santos, Jayme L. Szwarcfiter, Weighted connected matchings

12:55  Diego Amaro Costa, Sulamita Klein, Fernanda Couto, Providing a new approach to the study of split edge coloring classification problem

13:20  Paulo Sérgio Carreira, Danilo Artigas, Certifying Algorithms for Convexity in Graphs

13:45  Lia Martins, Meng Huey Hsu, Raquel Folz, Rosiane de Freitas, Tower of Hanoi variations, pile problems and O.R. applications
CLAIO 2022 detailed program

Parallel session - Ibero-American Network on Multicriteria Evaluation and Decision (RED-M)
December 14, 2022 (Wednesday), 09:00 - 10:40 - Room 1101
Chair: José Luis Zanazzi

09:00 Miguel Angel Curchod, Sofia Carla Cortaberria, Modelo híbrido de mapeo de talento
09:25 Ygor Logullo, Lorran Rodrigues, Mischel Carmen Belderrain, Christopher Cerqueira, Pedro Kukulka, Amanda C. S. Silva, Marcos Santos, Using a combined MCDA method to support the choice of the architecture that best performs in space system requirements
09:50 José Francisco Zanazzi, José Luis Zanazzi, Daniel Pontelli, Nueva plataforma para el diseño de intervenciones organizacionales. Aplicación a un sistema de mantenimiento en la industria farmacéutica
10:15 Solange Garcia, Amanda Silva, Yara Cintra, Luiz Antonio Titton, Maria Lúcia Bahia Lopes, Mischel Carmen Neyra Belderrain, Compromise programming: Proposal of a decision model for investment evaluation in the context of sustainable development of communities

Parallel session - Routing and Spectrum Allocation I
December 14, 2022 (Wednesday), 09:00 - 10:15 - Room 1208
Chair: Annegret Wagler

09:00 Pedro H. Fernandes da Silva, Herve Kerivin, Annegret Wagler, On bounds for the minimum spectrum width for routing and spectrum assignment in optical networks
09:50 Herve Kerivin, Pedro H. Fernandes da Silva, Michel Morvan, Annegret Wagler, Solving the Routing and Spectrum Assignment Problem with realistic transmission paths in Elastic Optical Networks

Parallel session - Special session honoring Jayme Szwarcfiter III
December 14, 2022 (Wednesday), 09:00 - 10:40 - Room 1209
Chair: Marcos José Negreiros Gomes

09:00 Lucía Busolini, Guillermo Durán, Martín D. Safe, Characterization of balanced graphs within claw-free graphs
09:25 María Guadalupe Sanchez Vallduvi, Marisa Gutierrez, Bernardo LLano, The tau operator on oriented indifference graphs
09:50 Lívia Medeiros, Fabiano Oliveira, Jayme Szwarcfiter, An algorithmic upper bound for the interval count of an order
10:15 Marcos Negreiros, AVL is Always AVL!
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Parallel session - OR in Agriculture II
December 14, 2022 (Wednesday), 09:00 - 10:15 - Room 1301
Chair: Cesar David Osorio Castañeda

09:00  Javier Gómez-Lagos, Marcela González-Araya, Luis Acosta-Espejo, Wladimir Soto-Silva, Optimizing major fruit tactical harvest planning through a multi-objective metaheuristic based on GRASP with path relinking

09:25  Bryan Urra-Calfuñir, Carlos Monardes-Concha, Pablo A. Miranda-González, Production planning optimization of olive growers for the use of mobile Olive-Oil Mills

09:50  Cesar David Osorio Castañeda, Juan Pablo Orejuela Cabrera, Juan José Bravo Bastidas, Milk Collection Problem with time dependent energy consumption

Parallel session - Logistics II
December 14, 2022 (Wednesday), 09:00 - 10:40 - Room 1302
Chair: Lara Caraballo

09:00  Leila Abdala, Javier Marenco, A heuristic procedure for the picker routing problem in a warehouse with mixed shelves

09:25  Alvaro Huerta, Pavlo Santander, Juan Sepulveda, Diseño de una cadena de suministro sostenible de recuperación de pilas

09:50  Mateo Cal, Daniela Duran, Alejandro Chavez, Víctor Viana, Héctor Cancela, Cooperación logística aplicada al sector forestal

10:15  Lara Caraballo, Alejando Cordatti, Facundo Correa, Pedro Piñeyro, Víctor Viana, Modelo para la planificación eficiente del transporte forestal: Un análisis del transporte bimodal de trozas en Uruguay

Parallel session - Applications of OR IV
December 14, 2022 (Wednesday), 09:00 - 10:40 - Room 1303
Chair: Yony Fernando Ceballos

09:00  Ricardo García, Zaida E. Alarcón-Bernal, Germán López Bautista, Rankin of PEMEX Exploration and Production budget assignments in terms of efficiency, with the Data Envelopment Analysis (DEA) technique

09:25  Sebastián San Martín, Miguel Alfar, Carlos Castro, Rocio Gajardo, Jeremías Vásquez, Simulación discreta de un servicio de salud intermedio: Caso de estudio servicio de atención primaria de urgencia de alta resolución

09:50  Miguel Bagajewicz, Andre Hemerly Costa, New efficient set trimming and smart enumeration method for Mixed-Integer Nonlinear Engineering Problems with discrete independent variables

10:15  Yony Fernando Ceballos, Julián Andrés Castillo Grisales, Lina Maria Bastidas Orrego, Natalia Jaramillo, Modelado de políticas públicas asociadas al fortalecimiento de las unidades productivas agrícolas en Medellín
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**Parallel session - Algorithms III**
December 14, 2022 (Wednesday), 09:00 - 10:40 - Room 1304
Chair: Jessé de Souza Deveza

09:00  Zaida E. Alarcón-Bernal, Ricardo Aceves-García, Ricardo Ávila-Gómez, Modeling a freight transportation system with hypergraphs

09:25  Silvia Adriana Ramos, María Natalia Piol, Lucas Lavandeira, Matías Reimondo, Santiago Augusto Pinto, Andrea Saralegui, Susana Boeykens, Selección de sistemas sorbato-adsorbente para el tratamiento de efluentes mediante la aplicación de modelos de decisión

09:50  Clarice de Souza, João Alfredo Bessa Neto, Micael Davi Lima de Oliveira, Jonathas Nunes da Silva, Kelson Mota, Rosiane de Freitas, Structural prediction and validation strategies for Sars-Cov-2 macromolecules

10:15  Jesse Deveza, Lucas Cordeiro, Rosiane de Freitas, Application of interval arithmetic and constraint programming in the optimization of formal verification processes

**Parallel session - Special session honoring Nelson Maculan III**
December 14, 2022 (Wednesday), 09:00 - 10:40 - Room 1305
Chair: Erik Alex Papa Quiroz

09:00  Marcella Braga, Nelson Maculan, Renan Pinto, New mixed integer nonlinear optimization models for the Clustering Problem

09:25  Gabriel Guimarães, Kelly Poldi, An integer linear programming formulation for the cutting stock problem with limited open stacks

09:50  S. Raghavan, Rui Zhang, The Driver-Aide Problem: Coordinated logistics for last-mile delivery

10:15  Erik Alex Papa Quiroz, Finite termination and estimation of the solution of the proximal point method with quasiconvex functions on Hadamard manifolds

**Parallel session - General aspects of OR I**
December 14, 2022 (Wednesday), 09:00 - 10:40 - Room 1306
Chair: Claudia Beatriz Peretto

09:00  Elias Olivares-Benitez, Jose Humberto Ablanedo-Rosas, Aaron Guerrero-Campanur, Samuel Nucamendi-Guillén, A systematic literature review on ethics in Operations Research

09:25  Veljko Uskokovic, Mladen Stamenkovic, Veljko Jeremic, A quest for methodologically robust composite index development: A case study for the evaluation of global citizens' wellbeing and liveability

09:50  Matías Emiliano Videla, Carlos Chiappa, Pedro Piñeyro, Víctor Viana, Daniel Rossit, Cloud Manufacturing: state of the art and evaluation of the BaSyx project

10:15  Claudia Peretto, Enzo Concordano, El sector bancario argentino entre 2000 y 2017: Un análisis de eficiencia paramétrico con funciones de distancia
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Parallel session - VRP IV
December 14, 2022 (Wednesday), 09:00 - 10:40 - Room 1307
Chair: Thailsson Clementino de Andrade

09:00  Alejandro Arenas-Vasco, Juan Carlos Rivera, Maria Gulnara Baldoquin, Simón Álvarez, Effects of different formulations and software parameters over a Heterogeneous Fleet Multi Depot Periodic Capacitated Vehicle Routing Problem with Time Windows

09:25  Daniel Morillo-Torres, Aura M. Vargas-Quintero, Álvaro I. Ocampo-Jiménez, Gustavo Gatica, A novel stochastic optimization model to solve the Vehicle Routing Problem with Backhauls and Time Windows by integrating the sample average approximation with Goal Programming

09:50  Fernando R. Senna, Pedro Munari, Antonio C. Moretti, Reinaldo Morabito, The Vehicle Routing Problem with Time Windows and Multiple Deliverymen considering two-level decisions: formulations and solution methods

10:15  Thailsson Clementino, Rosiane de Freitas, Eduardo Uchoa, Notes on the Vehicle Routing Problem with time windows and scheduling constraints

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Parallel session - Special session honoring Andrés Weintraub
December 14, 2022 (Wednesday), 09:00 - 10:40 - Room 1309
Chair: Pablo Rey

09:00  Alejandro Alvarez, Guillermo Duran, Manuel Duran, Ivan Monardo, 301060.exactas.uba.ar: A homage to Diego Maradona through mathematical models for Qatar 2022 results prediction

09:25  Filipe Alvelos, David Neto, Eduardo Cunha, Mendes André, An optimization framework for fire-related decision making

09:50  Benjamín Ulloa Sanhueza, Cristián E. Cortés, Pablo A. Rey, Raúl Espinoza, Marco de integración meso-microscópica enfocada en la simulación de tráfico de buses de transporte público

10:15  Alejandro Cataldo, Arturo Wenzel, Antoine Sauré, Pablo Rey, Enfoque de Modelos de Decisión Markovianos para la calendarización de sesiones de quimioterapia en una red de centros oncológicos

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Plenary session - "Keep on Learning": towards the development of optimisers that continually adapt", Emma Hart (EURO Distinguished Lecturer), Edinburgh Napier University
December 14, 2022 (Wednesday), 11:10 - Aula Magna
Chair: Mariana Escalante
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Parallel session - Ibero-American Network on Multicriteria Evaluation and Decision (RED-M)
December 14, 2022 (Wednesday), 12:30 - 13:45 - Room 1101
Chair: Carmen Belderrain

12:30 Lana Priscila Cavadas da Silva, Lincoln Campelo Dias, Pablo Luiz Berriel Do Carmo Teófilo, Níssia Carvalho Rosa Bergiante, Ensino público brasileiro: Proposta de estruturação da implantação do novo ensino médio pela ferramenta de pesquisa operacional soft SCA

12:55 Hudson Hübner de Souza, Pedro Soares de Souza, Pablo Luiz Berriel Do Carmo Teófilo, Lana Priscila Cavadas da Silva, Níssia Carvalho Roas Bergiante, Identification of Values and Alternatives for Decision Making through the VFT Approach: a case study in Maracanã Village

13:20 Maria Júlia Menezes Firmino Lima, Ana Carolina Cordeiro Luna Martins Silva, Luciana Alencar, Using value-focused thinking to support the BIM implementation in construction projects of public administration

Parallel session - Routing and Spectrum Allocation II
December 14, 2022 (Wednesday), 12:30 - 13:20 - Room 1208
Chair: Hervé Kerivin

12:30 Mariana Escalante, Martín Matamala, Ivan Rapaport, Paola Tolomei, Luis M Torres, On the weighted Minimum Clique Routing Problem

12:55 Federico Bertero, Javier Marenco, Valid inequalities for the DR-AOV integer programming formulation of the routing and spectrum allocation problem

Parallel session - General aspects of OR II
December 14, 2022 (Wednesday), 12:30 - 14:10 - Room 1209
Chair: Guadalupe Pascal

12:30 Laura Plazola Zamora, Algunas reflexiones sobre la brecha de género en la Sociedad Mexicana de Investigación de Operaciones

12:55 Cristóbal Mauricio, Óscar C. Vásquez, Estrategias para afrontar un test: Una mirada desde la secuenciación con incertidumbre explorable

13:20 Melany Segarra Marinetti, María Alejandra Castellini, A survey on soft IO and multimethodology in Latin America

13:45 Marcelo Corbalan, Guadalupe Pascal, Andres Redchuk, Desarrollo de casos sobre optimización y programación matemática para la formación de competencias en Investigación Operativa
CLAIO 2022 detailed program

Parallel session - Logistics III
December 14, 2022 (Wednesday), 12:30 - 14:10 - Room 1301
Chair: Robert Dell

12:30 Lucas Thomaz Januario Pinto, Willy Alves de Oliveira Soler, Maristela Oliveira Santos, A mathematical model for production and distribution planning of credit cards

12:55 Mauro Lucci, Paula Zabala, Daniel Severin, Un abordaje mediante PLE para un problema de transporte de mercadería con cambios de tripulación

13:20 Sergio Bonino, Luis Zeballos, José Laínez Aguirre, Akash Moolya, Jose Pinto, Ignacio Grossmann, Carlos Mendez, Advanced MILP-based strategies for logistics decisions in industrial gases supply chains

13:45 Robert Dell, David Marlow, Optimizing management of a military aircraft fleet

Parallel session - Graph theory and combinatorial optimization
December 14, 2022 (Wednesday), 12:30 - 14:10 - Room 1302
Chair: Luis F. Zuluaga

12:30 Vitor Tocci F. de Luca, María Pía Mazzoleni, Fabiano S. Oliveira, Jayme L. Szwarcfiter, On edge intersection graphs of paths on a triangular grid: Characterization and clique coloring

12:55 Pablo De Caria, María Pía Mazzoleni, María Guadalupe Payo Vidal, Sobre la Clique Coloración de los Grafos EPT en árbol huésped de grado acotado

13:20 Liliana Alcón, Martin Charles Golumbic, Noemí Amalia Gudiño, Marisa Gutierrez, Vincent Limouzy, On dually-CPT and strong-CPT posets

13:45 Rodolfo Quintero, David Bernal, Tamás Terlaky, Luis Zuluaga, Characterization of QUBO reformulations for the maximum k-colorable subgraph problem

Parallel session - Applications of OR V
December 14, 2022 (Wednesday), 12:30 - 14:10 - Room 1303
Chair: Juan David Palacio Domínguez

12:30 Maria Araceli Garin, Laureano F. Escudero, Aitziber Unzueta, On Lagrangean Dualization of the RLT1 formulation for the Cross-dock Door Assignment Problem

12:55 Hector Cancela, Marcos Fierro, Adrián Manera, Martín Prino, Optimization methods for units’ assignment in housing cooperatives

13:20 Citlali M. Olvera-Toscano, Yasmin A. Ríos-Solís, Roger Z. Ríos-Mercado, Comparative analysis of different solution methods for the bus bunching problem

13:45 Juan David Palacio, Juan Carlos Rivera, The two-echelon bicycle repositioning problem with split delivery
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Parallel session - Supply chain optimization II
December 14, 2022 (Wednesday), 12:30 - 14:10 - Room 1304
Chair: Marco Antonio Montufar Benitez

12:30 Franco Basso, Guillermo Ibarra, Raul Pezoa, Mauricio Varas, Horizontal collaboration in the wine supply chain planning: A Chilean case study
12:55 Roberto Miranda, Carlos Monardes, Elbio Avanzini, Info Gap Decision Theory for handling deep uncertainties in an Agribusiness Supply Chain
13:20 Isabel Cristina Alzate Rendón, Eva Cristina Manotas Rodríguez, The impact of supply chain dynamic capabilities and horizontal collaborative networks over collaborative risk management: The case of Hass Avocado in Antioquia - Colombia
13:45 Eder Renato Delgado Ávila, Lucero Ramírez Melo, Marco Antonio Montúfar Benítez, Gilberto Pérez Lechuga, Sergio Bias Ramírez Reyna, Set Covering Problem applied to relocation of a supply center

Parallel session - Queueing theory and metaheuristics
December 14, 2022 (Wednesday), 12:30 - 14:10 - Room 1305
Chair: Vladimír Holý

12:30 Anshul Kumar, Madhu Jain, Cost optimization and analysis of multi-server queue with working vacation and imperfect service
12:55 Sibasish Dhibar, Prof. Madhu Jain, Firefly algorithm for cost optimization of FM/FM/1/WV retrial queue with catastrophes
13:20 Mauricio Moyano, Nicolle Ojeda-Ortega, Paula Zabala, Gustavo Gatica, Guillermo Cabrera-Guerrero, Multi-objective evolutionary algorithms for Bi-objective Composite Retrieval
13:45 Vladimír Holý, Ondřej Sokol, Modeling customer visits by score-driven model with negative binomial distribution

Parallel session - OR and the environment I
December 14, 2022 (Wednesday), 12:30 - 14:10 - Room 1306
Chair: Michelle Zambra

12:30 Jaime Carrasco, Florencia Cristensen, Jorge Hoyos-Santillan, Mauricio Acuna, Alejandro Miranda, Cristobal Pais, Andrés Weintraub, Mitigation of greenhouse gas emissions through landscape management
12:55 Antone dos Santos Benedito, Claudia Pio Ferrreira, Helenice de Oliveira Florentino Silva, Feedback linearization and optimal control for Aedes aegyti populations
13:20 Nathaly Martínez Escobar, Jeniffer Guadalupe Insuasty Reina, Juan Carlos Osorio Gómez, Diego Fernando Manotas Duque, Evaluación dinámica de los efectos ambientales de la inclusión de hidrógeno como vector energético no convencional en Colombia
13:45 Michelle Zambra, Pablo Miranda, Carola Blazquez, A multiperiod household solid waste collection system for a set of rural islands with transfer port selection
Parallel session - Stochastic optimization III
December 14, 2022 (Wednesday), 12:30 - 14:10 - Room 1307
Chair: Nicolás Vargas Cisternas

12:30  Iago Leal de Freitas, Joaquim Dias Garcia, A Multicut Approach to Calculate Upper Bounds for Risk Averse SDDP

12:55  Victor Viana, Hector Cancela, Lorena Pradenas, Optimización Estocástica aplicada a la planificación forestal en Uruguay

13:20  Germán Ferrari, Carlos E. Testuri, Alberto Pardo, Lenguaje de dominio específico embebido para programación estocástica multietapa en Scala

13:45  Nicolas Vargas, Mathias Klapp, Alejandro Mac Cawley, Two stage portfolio optimization for commodity exports

Parallel session - Planning and urban planning
December 14, 2022 (Wednesday), 12:30 - 14:10 - Room 1308
Chair: Fabrizio Nadir Recalde Rivas

12:30  Rodrigo Santos, Paula Zabala, Matías Micheletto, Heurística de asociación y planificación de mensajes periódicos de tiempo real en ciudades inteligentes basadas en una extensión del protocolo LoRaWAN

12:55  Diego Fiorotto, Silvio de Araujo, Raf Jans, Problema integrado da mistura e dimensionamento de lotes

13:20  Jakub Hanousek, Evaluation of quality of life by data envelopment analysis

13:45  Fabrizio Nadir Recalde Rivas, Jorge L. Recalde-Ramírez, María Margarita López de Recalde, Surveillance and security managing of municipal parks through servers location: the case of the Asunción Botanical Garden and Zoo

Parallel session - OR and statistics II
December 14, 2022 (Wednesday), 12:30 - 14:10 - Room 1309
Chair: Deisemara Ferreira

12:30  Charles Thraves, Sebastián Morales, Parametric estimation under diffuse observations: An application on pooling election polls

12:55  Gastão Coelho Gomes, Probabilidade, Jogos de Azar e o Software R

13:20  Rafael Jiménez Llamas, Pepa Ramírez Cobo, Emilio Carrizosa Priego, Fairness in linear regression. A novel approach from a Bayesian perspective

13:45  Felipe Goulart Moraes, Deisemara Ferreira, Reinaldo Morabito, Pedro Miranda Lugo, A study of the effects of considering carbon emissions on the production planning and vehicle routing problem in a furniture industry
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Parallel session - Ibero-American Network on Multicriteria Evaluation and Decision (RED-M)
December 15, 2022 (Thursday), 09:00 - 10:15 - Room 1101
Chair: Mariana Funes

09:00  Jessyca Samarithana Ferreira Aires, Caroline Mota, Duan Vilela Ferreira, Ciro José Jardim de Figueirêdo, Paulo Antônio Xavier Furtado, Suitability analysis for photovoltaic solar energy generation based on GIS-MCDM integration

09:25  Javier Pereira, Pedro Contreras, Danielle Morais, Comparison of stochastic multiobjective acceptability analysis based methods in a multi-criteria location problem

09:50  Hernán Pablo Guevel, Josefina Racagni, Mariana Funes, José Miguel Vargas Soria, Confección de carteras de activos que cotizan en el mercado de valores argentino aplicando una metodología en etapas

Parallel session - DEA
December 15, 2022 (Thursday), 09:00 - 10:40 - Room 1208
Chair: Mariana Arburua

09:00  Samuel Martins Drei, Lidia Angulo-Meza, Lean Healthcare efficiency assessment in Brazilian public hospitals using Slack-based Measure Data Envelopment Analysis (SBM-DEA)

09:25  Elias Olivares-Benitez, Jose Humberto Ablanedo-Rosas, Aaron Guerrero-Campanur, Evaluación de la eficiencia de cultivos de Aguacate Hass usando Análisis Envolvente de Datos

09:50  Fabio Sartori Piran, Daniel Pacheco Lacerda, Maria Conceição A. Silva, Ana S. Camanho, Ricardo A. Cassel, Internal benchmarking to assess the cost efficiency intra and inter production unit: an exploratory analysis combining data envelopment analysis and throughput accounting

10:15  Patricia Alejandra Iñiguez, Juan Manuel Gallardo, Mariana Arburua, Pablo Pagano, Fernando Javier Negro, Métodos de selección de variables para la evaluación de la eficiencia con modelos DEA y datos de panel. Revisión de algunos enfoques.
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Parallel session - Facility location
December 15, 2022 (Thursday), 09:00 - 10:40 - Room 1209
Chair: Giovanni Giuliano

09:00 Paulina Tapia, Pablo Escalona, Alejandro Angulo, The Joint Location-Inventory Problem under continuous review (Q, r) policy with Fill-rate service level constraint
09:25 Steven Chau Yip, Armin Lüer-Villagra, A profit-maximizing hub network design problem considering users’ probabilistic utility functions
09:50 Cindy Infante Eguis, Jesús Mora Movilla, Carlos Torres Morales, Kelly Bejarano Movilla, Andrés Porto Solano, Álvaro Mercado Cruz, Effective location of technological laboratories in rural municipalities of the Atlántico department, Colombia: A two-stage stochastic optimization model
10:15 Giovanni Giuliano, Pablo A. Miranda, Francisco J. Tapia-Ubeda, A two-stage inventory location problem model for resilient and robustness supply chain network design

Parallel session - OR in Energy V
December 15, 2022 (Thursday), 09:00 - 10:40 - Room 1301
Chair: Maria Camila Aristizábal Cataño

09:00 Ellen Cavalheiro, Christiano Lyra, Optimal network configuration for multiperiod operation of power distribution systems equipped with smart grid innovations
09:25 Nicolás Allendes, Francisca Jalil, Tito Homen-de-Mello, Gabriela Pinto, Renewable energy-based hydrogen supply chains, a Chilean case study for green hydrogen production limited to water conditions
09:50 Laura Ribeiro Fardin, Christiano Lyra Filho, Upstream-Downstream Optimization of Volt-Var Control in distribution networks
10:15 Maria Camila Aristizábal Cataño, Martha Carolina Lima Rivera, Juan Pablo Orejuela Cabrera, Diego Fernando Manotas Duque, Portafolio de generación de energía eléctrica en mercados hidrotérmicos considerando las fuentes no convencionales de energía renovable, caso de estudio Colombia
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Parallel session - TSP
December 15, 2022 (Thursday), 09:00 - 10:40 - Room 1302
Chair: Natalia Estefania Villanueva De la Fuente

09:00 Gustavo Angulo, Diego Moran, On Optimal MTZ-like Formulations For The Asymmetric TSP
09:25 Ondřej Sokol, Vladimír Holý, Efficient team orienteering problem: A sightseeing tour optimization
09:50 Saúl Domínguez Casasola, José Luis González Velarde, Yasmín Á. Ríos Solís, A comparison between exact and non-exact methods for solving the Capacitated Family Traveling Salesperson Problem
10:15 Natalia Villanueva De la Fuente, Carlos Obreque Niñez, Guillermo Latorre Núñez, Patricio Álvarez Mendoza, Alex Barrales Araneda, Carlos Bizama Fica, The Multiperiod Set Team Orienteering Problem with Time Windows

Parallel session - Metaheuristics
December 15, 2022 (Thursday), 09:00 - 10:40 - Room 1303
Chair: Antonio Augusto Chaves

09:00 Petra Tomanová, Vladimír Holý, Mean-Variance optimization in pairs trading using ultra-high-frequency data
09:25 Carlos Rodriguez, Katya Rodriguez, Applying a multi-objective evolutionary algorithm in portfolio optimization
09:50 José-Fernando Camacho-Vallejo, Juan G. Villegas, Carlos Corpus, A review about the use of metaheuristic algorithms for solving bilevel programming problems: beginnings, consolidation and present
10:15 Bruno Vieira, Antonio Augusto Chaves, An adaptive BRKGA-QL to solve the Patient Bed Assignment Problem and the Operating Room Scheduling Problem

Parallel session - OR in Economy III
December 15, 2022 (Thursday), 09:00 - 10:40 - Room 1304
Chair: Eduar Fernando Aguirre Gonzalez

09:00 Guillermo Gallego, Gerardo Berbeglia, Bounds and heuristics for Multi-Product Personalized Pricing
09:25 Paloma Nuñez-Muñoz, Óscar C. Vásquez, Economía circular y sistemas productivos en paises del Sur Global: ¿Fomentando nuevos commodities?
09:50 Veljko Jeremic, Vesna Damnjanovic, Radmila Janicic, Mapping the startup ecosystem of emerging countries: Methodological challenges and policy implications for Serbia
10:15 Eduar Fernando Aguirre Gonzalez, Diego Fernando Manotas Duque, Pablo Cesar Manoyoma Velásquez, Efficiency and performance evaluation model of collective investment funds in Colombia
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Parallel session - Rostering and applications
December 15, 2022 (Thursday), 09:00 - 10:40 - Room 1305
Chair: Sara Ruth Peralta Chávez

09:00 Andrés Porto Solano, Paola Cruz Mayoral, Anyela Mejía Nuñez, Yira Pedrozo Contreras, Sebastián Herazo Pretelt, Lina Piocuda Vasquez, Annualized hours contract with flexible working day: A personnel planning approach

09:25 Jennifer Izquierdo-Salazar, Sofia Charry-Alvernia, Sebastián Orjuela-Isaza, Ronaldo Caicedo-Scarpetta, Daniel Morillo-Torres, Gustavo Gatica, Design of a realistic multifunctional staffing model for the reduction of labor force costs in the retail sector

09:50 Andrés Porto, César Henao Botero, Amaia Lusa, Oliver Polo, Roberto Porto, Labor Flexibility Strategies: Annualized hours, multiskilling and overtime to solve an a Personnel Scheduling Problem

10:15 Sara Ruth Peralta Chavez, Sara Alexandra Ruiz Díaz Villagra, María Margarita López de Recalde, Jorge L. Recalde-Ramírez, Production and inventory planning of silk skeins from the breeding of Bombyx Mori worms using mathematical models

Parallel session - Simulation II
December 15, 2022 (Thursday), 09:00 - 10:40 - Room 1306
Chair: Marco Antonio Montufar Benitez

09:00 David Mora-Meza, Julian Alberto Espejo-Díaz, William Guerrero, Finding the bottleneck in hospital emergency departments considering the COVID-19 pandemic. Insights from a simulation approach and a case study

09:25 Natalia Karstegl, Manuel Vargas, Miguel Alfaro, Guillermo Fuertes, Diego Muñoz, Simulación de agente para la modelación de la epidemia COVID-19 mediante cuarentenas intermitentes

09:50 Jaromír Antoch, Lev Klebanov, Michal Cerny, Estimation of the quantile function using Bernstein polynomials and its use for steady state simulations and VaR estimation

10:15 Marco Antonio Montufar-Benitez, Jaime Mora-Vargas, Carlos Arturo Soto-Campos, Gilberto Pérez-Lechuga, José Raúl Castro-Esparza, A simulation model to analyze the behavior of a faculty retirement plan. A case Study in México
### Parallel session - Column generation
December 15, 2022 (Thursday), 09:00 - 10:40 - Room 1307
Chair: Renaud Chicoisne

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<td>Ignacio Vitale, Mariana Cóccola, Rodolfo Dondo</td>
<td>Optimization of log Inventory and log routing by column generation</td>
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<td>09:25</td>
<td>Felipe Lemos, Adriana Cherri, Silvio Alexandre de Araujo</td>
<td>Cutting stock problem integrated to the minimization of weighed tardiness</td>
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<td>Victor Hugo Nascimento, Luidi Gelabert Simonneti</td>
<td>A new branch and price algorithm for the Stop Number Minimization Problem</td>
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<td>10:15</td>
<td>Renaud Chicoisne</td>
<td>Computational aspects of column generation methods for nonlinear optimization</td>
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### Parallel session - Combinatorial optimization II
December 15, 2022 (Thursday), 09:00 - 10:40 - Room 1308
Chair: Manuela Blaum

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<td>Pablo Terlisky, Francisco Soulignac, Javier Marenco</td>
<td>Integrality of the representation polyhedron for circular-arc models</td>
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<td>Mariana Escalante, Erica G. Hinrichsen, Valeria Alejandro Leoni</td>
<td>On a characterization of graphs with perfect neighbourhood matrices</td>
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<td>Blanca Irene Rios Ceupen, Jose Colbes, Diego P. Pinto-Roa</td>
<td>Planificación del ciclo productivo de lotes avícolas en granjas parrilleras. Caso de estudio</td>
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<td>10:15</td>
<td>Manuela Blaum, Javier Marenco</td>
<td>Generalization of rank inequalities for several MIP models</td>
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### Parallel session - Special track: OR in Health and Healthcare Services I
December 15, 2022 (Thursday), 09:00 - 10:40 - Room 1309
Chair: Fermin Mallor

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<td>09:00</td>
<td>Blanca Sanchez-Robles, Ricardo Diaz</td>
<td>Efficiency in the CRO industry: A DEA analysis</td>
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<td>09:25</td>
<td>Daniel Garcia-Vicuña, Laida Esparza, Fermin Mallor</td>
<td>A methodological framework for analyzing the physician decision-making process for ICU bed management</td>
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<td>09:50</td>
<td>Maria Carolina Poveda, David Barrera Ferro, Sally Brailsford, Raul Murillo, Diego Patino</td>
<td>Prioritizing patients for upper gastrointestinal endoscopy: A machine learning approach</td>
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<td>10:15</td>
<td>Juan Pablo Contreras, Mauricio Varas, Franco Basso, Raúl Pezoa, Felipe Baesler, María Francisca Rojas, Ricardo Ronco</td>
<td>Scheduling home health care services: a case study in the Chilean public sector</td>
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Plenary session - "Applied mathematical optimization: success stories in logistics and planning", Antonio Alonso-Ayuso, Universidad Rey Juan Carlos, Spain
December 15, 2022 (Thursday), 11:10 - Aula Magna
Chair: Pablo Rey

The DSLab (Data Science Lab) of the Universidad Rey Juan Carlos (Madrid, Spain) has a research group specialized in Mathematical Optimization (linear, discrete, and stochastic) applied to planning and logistics problems. In this talk, we will present the last problems in which this group has worked applying Discrete Mathematical Optimization for the improvement of production processes in two large companies.

First, with an oil company, we have developed a model for tactical (one year ahead) and operational (several days ahead) planning of the logistics network for distribution in a Latin American country, achieving significant cost savings with an improvement in the level of service.

The second problem analyzed is framed in the steel industry. In collaboration with a leading company in Spain, we have developed models to design the cutting patterns of steel coils, taking into account that the stock is heterogeneous and that both the customers and the slitting lines impose many technical constraints on the final product (conditions that depend on the operation mode). The results are a great improvement for the company and a reduction by more than 60% the leftovers, improving stock management.

Finally, we will introduce the first results that we are obtaining in collaboration with a Spanish company dedicated to the manufacture of honeycomb cardboard, where the first models are representing a great improvement in the reduction of leftovers (up to 90% in some cases).

A coming characteristic of those approaches is the dramatic reduction in the time needed for planning: from several hours to just a few minutes.

Parallel session - Networking session: Democratization of Operations Research through Artificial Intelligence, Cipriano Santos, Tecnológico de Monterrey, México
December 15, 2022 (Thursday), 14:00 - Room 1101
Chair: José Gómez Rocha
### Parallel session - OR and sustainability
December 15, 2022 (Thursday), 14:00 - 15:40 - Room 1208
Chair: Demian J. Presser

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<td>Matias Ponce Toro, Andrea Espinoza</td>
<td>Priorización de objetivos para el desarrollo de cadenas de abastecimiento sostenibles</td>
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<td>Karen Angelica Pérez Rojas, Marcela González-Araya, Lidia Angulo Meza, Alfredo Iriarte</td>
<td>La influencia de la sustentabilidad social en la eficiencia de las ciudades al enfrentar una pandemia</td>
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<td>Virna Ortiz-Araya, Adela Pagès-Bernaus</td>
<td>Optimización sustentable en una cadena de suministro empleando un modelo de ruteo vehicular con tiempos de servicio estocásticos</td>
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<td>Demian J. Presser, Diego C. Cafaro, Ignacio E. Grossmann, Pratik Misra, Sanjay Mehta</td>
<td>Towards the optimal management of carbon intensity indicators in the operation of sustainable supply chains</td>
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### Parallel session - OR in Energy VI
December 15, 2022 (Thursday), 14:00 - 15:40 - Room 1209
Chair: Caio dos Santos

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<td>Sebastian Felipe Castellanos Buitrago, Pablo Andrés Maya Duque, Walter Mauricio Villa Acevedo, Santiago Marulanda Escobar, Mateo Giraldo Zuluaga</td>
<td>Two-phase approach model for sizing microgrids in non-interconnected zones of Colombia</td>
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<td>Tito Homem-de-Mello, Frederic Babonneau, Esnil Guevara</td>
<td>Modeling uncertainty processes for multi-stage optimization of strategic energy planning</td>
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<td>14:50</td>
<td>Andre Salles, Ana Carolina Carvalho Souza</td>
<td>Some considerations on similarities of the energy transition processes of national economies using clustering models</td>
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<td>15:15</td>
<td>Caio dos Santos, José Carlos Garcia Andrade, Christiano Lyra</td>
<td>Optimized reinforcement planning of modern power distribution systems to support the electric vehicle charging infrastructures</td>
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### Parallel session - Scheduling II
December 15, 2022 (Thursday), 14:00 - 15:40 - Room 1301
Chair: Jean Paul Morán Zabala

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<td>14:00</td>
<td>Aldana Stefania Tibaldo, Jorge Marcelo Montagna, Yanina Fumero</td>
<td>A bi-objective optimization model for simultaneous short-term production and distribution scheduling in process industries</td>
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<td>14:25</td>
<td>Guillermo A. Durán, Manuel Durán, Nazareno A. Faillace Mullen, Juan Velasquez</td>
<td>Optimizing the production scheduling of a manufacturer of bottle closures</td>
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<td>Jeanette Rodriguez, Daniel Rossit</td>
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<td>Jean P. Morán-Zabala, Juan M. Cogollo-Flórez</td>
<td>An optimization approach for process quality profile modeling</td>
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Parallel session - OR and the environment II
December 15, 2022 (Thursday), 14:00 - 15:40 - Room 1302
Chair: Katherin del Pilar López Cartes

14:00 Maria Ignacia Rivera, Manuel Vargas, Jorge Zamorano, Aceptabilidad de políticas ambientales y reducción de emisiones
14:25 Felipe Rivera Pradenas, Jorge Zamorano, Manuel Vargas, Localización de empresas bajo regulación ambiental y tecnologías de abatimiento
14:50 Jorge Pavez, Isabel Trivino, Jorge Zamorano, Manuel Vargas, Rol del mecanismo de asignación de permisos de contaminación en los incentivos de reubicación de empresas.
15:15 Felipe Rivera Pradenas, Katherin López, Jorge Zamorano, Localización de firmas bajo múltiples instrumentos económicos en la consistencia temporal de la regulación ambiental

Parallel session - Game theory
December 15, 2022 (Thursday), 14:00 - 15:40 - Room 1303
Chair: Conrado Miguel Manuel García

14:00 Enrique Simpson, Pablo Escalona, Nathalia Wolf, Luce Brotcorne, Spot fare inspections under non-adaptive opportunistic passengers and mass inspection policy using a Stackelberg game approach
14:25 Mario Ramirez, Pablo Escalona, Luce Brotcorne, Fare inspection patrolling under instation selective inspection policy using a Stackelberg approach
14:50 Juan Tejada, Elisenda Molina, Fairouz Medjahed, Competencia en la difusión de la información y estrategias de centralidad en redes sociales
15:15 Elena Gavilán, Conrado Manuel, Daniel Martín, Communication in weighted networks. A game theoretic approach

Parallel session - Logistics IV
December 15, 2022 (Thursday), 14:00 - 15:40 - Room 1304
Chair: Edgar Ricardo Silva Russi

14:00 Jefferson Matos, Vitor Curtis, FLP for last mile distribution centers: comparison between GRASP and Genetic Algorithm metaheuristics
14:25 Marcos Negreiros, Augusto Palhano, Eduardo Reis, General sector-routing, application results in downtown Petropolis/RJ
14:50 Bryan David Galarza Montenegro, Kenneth Sörensen, Pieter Vansteenwegen, Towards better service quality with the dynamic feeder service with a maximum headway at mandatory stops
15:15 Edgar Ricardo Silva Russi, Nacima Labadie, Caroline Prodhon, The two-echelon vehicle routing problem with customer to parcel locations and grey zone for inner-city logistics
CLAIO 2022 detailed program

Parallel session - Combinatorial optimization III
December 15, 2022 (Thursday), 14:00 - 15:40 - Room 1305
Chair: Lanier Menezes dos Santos

14:00  Letícia Pavanello, Carlos Diego Rodrigues, Adriana Cherri, Uma matheurística de janela deslizante para o floorplanning VLSI
14:25  Abilio Lucena, Vinicius Forte, Said Hanafi, New formulations for perfect domination problems and their algorithmic implications
14:50  Matheus Corrêa, Abilio Lucena, Formulations and algorithms for arc reversal, arc addition or arc complement in digraphs
15:15  Lanier Santos, Jesse Deveza, Lucas Cordeiro, Rosiane de Freitas, Combinatorial methods to explore CFG paths in BMC counterexamples

Parallel session - Machine Learning III
December 15, 2022 (Thursday), 14:00 - 15:40 - Room 1306
Chair: Lauriza del Carmen Díaz Díaz

14:00  Veronica Diaz, Ricardo Montoya, Oded Netzer, The effects of pregnancy and child birth on consumption
14:25  Xavier Gonzalez, Horacio Rojo, Silvia Ramos, Facundo Andres Toniolo, Sofia Maira Parrino, Joaquin Renovales, Juan Palomeque, Noelia Lucia Florez Uria, Mateo Marco, Julieta Belén Romanelli, Desarrollo e Implementación de modelo corrector de definiciones en exámenes de Investigación Operativa basado en Inteligencia Artificial. Conozcan a BotIO, una experiencia pedagógica
14:50  Nuria Gómez-Vargas, Rafael Blanquero, Emilio Carrizosa, Custom neural networks: an approach to predict-and-optimize
15:15  Danna Vanessa Betancourt Martínez, Lauriza Del Carmen Díaz Díaz, Integration of machine learning with the AHP for the evaluation and improvement of the availability of vital medicines in the Colombian health system: A hospital logistics solution

Parallel session - Mixed Integer Programming II
December 15, 2022 (Thursday), 14:00 - 15:40 - Room 1307
Chair: Iván Derpich

14:00  Matias Anabalon, Franco Quezada, Óscar C. Vásquez, A branch-and-cut algorithm to solve the knapsack problem with scheduled items
14:25  Luciana Melchiori, Graciela Nasini, Jorge Marcelo Montagna, Gabriela Corsano, An integer linear programming model for the daily transportation planning in the sugarcane industry
14:50  Nicolás García Aramouni, Juan Jose Miranda Bront, Rescheduling the NBA regular season via Integer Programming
15:15  Ivan Derpich, Erick Miranda, Estimando el tamaño del árbol B&B en el Multidimensional knapsack problem (MKP)
CLAIO 2022 detailed program

Parallel session - Special track: OR in Health and Healthcare Services II
December 15, 2022 (Thursday), 14:00 - 15:15 - Room 1309
Chair: Fermin Mallor

14:00  Marta Cildoz, Pedro Mateo, Fermin Mallor, Physician scheduling in Emergency Departments: from the real problem to the solution implementation

14:25  Thiago A. O. Silva, Mauricio C. De Souza, Approximate dynamic programming to improve the scheduling of chemotherapy outpatients

14:50  Ignacio Aristimuño, Valentina Larzábal, María Eugenia Silvera, Pedro Piñeyro, Antonio Mauttone, Simulation in healthcare management: application to the emergency room of a hospital in Uruguay

Plenary session - "OR in Healthcare in Latin Ibero-America: Developments and research perspectives", Valentina Gutiérrez, Universidad del Valle, Colombia
December 15, 2022 (Thursday), 16:00 - Aula Magna
Chair: Paula Zabala

Since the beginning of the 80’s, the Operations Research (OR) community in Latin America has worked on OR applications in healthcare decision problems. However, much of that work is unknown or not published in international journals. Additionally, after more than 40 years, there is no formal group in the region contributing to structure and spread the work, showing the need to formalize the critical mass and promote the development of the field. Based on this need, initial efforts to formalize a working group in the region and to establish collaborating networks with the European community have taken place from Colombia. Thereby, in this work, we provide a comprehensive overview of the works completed by researchers in the region dedicated to study OR in healthcare, and then we identify collaboration opportunities with the community. Using a scientific database, we complete a structured literature review replicating previous taxonomies widely accepted in the field. We also identify key differences when using OR to support decisions in healthcare in the region. Preliminary results of the review, show an increasing interest of the community to study healthcare research problems. Furthermore, given the formalization of the Healthcare Working Group on OR in the Colombian Association of Operations Research (ASOCIO), we present a set of applications that can contribute to establish collaborating works and to generate a more mature community in the region.
CLAIO 2022 detailed program

Plenary session - "A stochastic programming approach for the operational fleet composition problem", Ramon Faganello Fachini and Camila Fernanda Contreras, Shipping OR Team, Mercado Libre, Argentina + Brazil + Chile
December 15, 2022 (Thursday), 17:30 - Aula Magna
Chair: Francisco Soulignac

Mercado Libre operates a transport network (MeliNet) to move every day hundreds of thousands of packages and products. At the daily Line Haul operation, short-term capacity planning is necessary to operate the shipping lanes in the network. In this context we introduce the operational fleet composition problem with stochastic demands (OFCP-SD). To tackle this problem at Mercado Libre scale we propose a two-stage stochastic programming formulation, in which the planned fleet size and mix decisions make up the first stage, while fix actions are taken in the second stage to hire extra vehicles or to make vehicle cancellations according to the observed demands. The hiring of extra vehicles implies additional costs, whereas the vehicle cancellations entail financial compensations. The objective is to minimize the fleet overall cost, which comprises the first-stage planned costs as well as the cost updates made by the fleet adjustments of the second-stage. To make the problem tractable, a demand forecasting procedure with an embedded scenario generation is devised. Furthermore, a variable fixation matheuristic is suggested for the OFCP-SD. A case study with extensive computational experiments is presented. The obtained results show the advantages of explicitly modeling the stochastic demands over a deterministic approach and underline the potential benefits to the business.

Closing ceremony
December 15, 2022 (Thursday), 18:30 - Aula Magna
Chair: Guillermo Durán