EURO PhD School 2025

Lleida, Spain, June 26th-July 4th

Optimization and Artificial Intelligence in Agriculture

FINAL REPORT

12 January 2026

Contents

1. Introduction

The EURO PhD School on Optimization and Artificial Intelligence in Agriculture (EPS 2025) was held in Lleida, Spain, between 26th of June and 4th of June 2025. In this document the Scientific and Organizing Committees present the final report of this EURO PhD School, with emphasis to the most relevant goals, activities and outcomes.

The EPS2025 was promoted by the EURO Working Group (EWG) on OR in Agriculture and Forest Management who prepared the proposal by the end of 2022. Finally, the agreement and approval to prepare such a proposal was taken in 2023, the proposal was submitted and approved by the EURO EXCO in January 2024.

Spanning the bridge between optimization theory and primary sector applications (mainly Agriculture and Forestry, but also Fisheries and Natural Resources in general) is one of the big challenges for the operations research community. Stochastic optimization and modern software implementations have become an indispensable resource in engineering sciences and economics. This high demand in interdisciplinary collaboration is, however, not adequately covered in most of the current curricula programs in applied mathematics or agronomic/food engineering.

Furthermore, nowadays, the use of AI combined with optimization and applied to Agriculture is definitively increasing. Other dimensions like climate change, globalization, traceability of agricultural products, food safety and sustainability have led to extremely complex problems not only by their intrinsic characteristics but also by the amount of data that needs to be combined. This data can be efficiently treated with AI methods to produce information useful for better decision making.

Having in mind all of the above-mentioned aspects, the board of the EWG on Agriculture and Forest Management proposed to apply for organizing a EURO PhD School on Optimization and Artificial Intelligence in Agriculture. All participants agreed and the coordinator of the group on behalf of the board did present the application for preparing the EPS 2025 in Lleida (Spain).

This is the second time that such a PhD School after two other editions of EURO Summer Institute (2009 and 2014) is organised. This EPS2025 combined AI, pure OR topics of Mathematical Programming, Sustainable Supply Chains, Games Theory among others with decisional problems in Agriculture. It was an opportunity to encourage people from the two areas to exchange their experiences and stimulate networking research.

During CLAIO 2024 (Latin American Conference of OR) held in Guadalajara (México) rose the opportunity of organising also a PhD Summer School in Lleida (Spain) and the

simultaneous celebration of both activities was judged adequate and potentially fruitful by the ALIO EXCO and the EWG ORAFM.

2. Venue

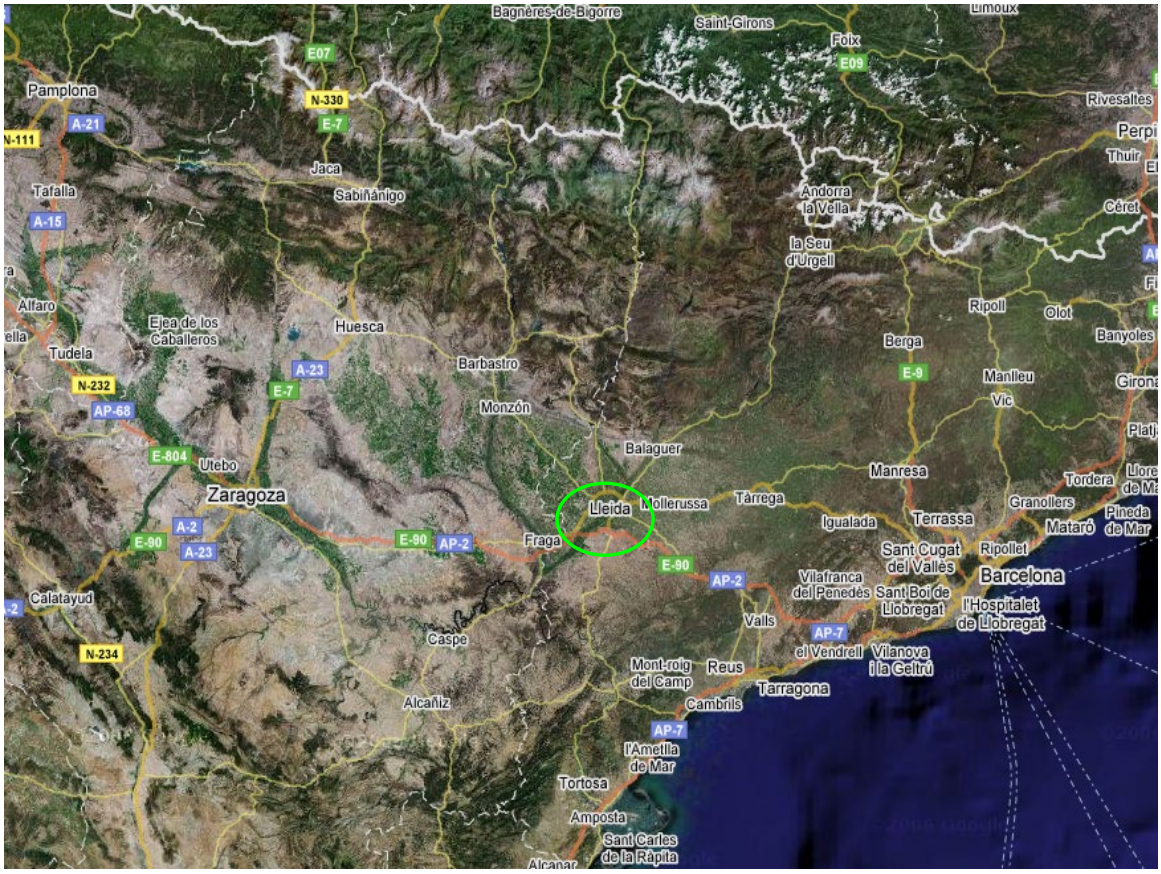
The EURO PhD School on Optimization and Artificial Intelligence in Agriculture was held in Lleida, which is a small town of the inland Catalonia, 160 kilometres away from Barcelona and 450 from Madrid (Figure 1). The EPS2025 was just after the EURO Conference held in Leeds the same week. This was made on purpose to facilitate the attendance of reputed keynote speakers and to reduce the travel expenses of them.

Lleida is a small town, it is the capital of the Province of the same name, surrounded by orchards and other crops and with a hot and dry weather in summer. The University of Lleida offered several facilities helping the organisation of this event. For instance, the campus of the Agronomic School (ETSEAFIV) has in a reduced area many buildings available for lectures, computer exercises and even the student's residence and many near restaurants. At the same time, the campus is settled in a walking distance of the city center.

All facilities were booked in Lleida for the EPS2025 since October 2024. This included accommodation in the Nastasi Hotel, a lecture room and a computer lab. The Nastasi Hotel had mostly double rooms and a few of single rooms, enough to cover the needs of participants. Furthermore, breakfast was also included for participants in the room. This way, all the academic activities, accommodation and main meals were held in a small area avoiding unnecessary transfers from the campus to the Hotel or vice versa. So on, discussions either in the lecture room or in the restaurant were more relaxed.

Transport to Lleida is easy either from Madrid or Barcelona. High speed trains were available to reach Lleida and recommended. Direct connections from Barcelona or Madrid airports to the corresponding central stations made easy and comfortable travelling to Lleida. The train station in Lleida is not far from the Nastasi Hotel. A taxi can pick people up there and bring them to the Residence for 7€. However, some participant with light baggage preferred to cover the distance on foot (30 minutes) and starting to be familiarised with the warm environment.

Figure 1: Lleida is settled inland, near Barcelona.



3. Organization details

The application for organizing the EPS2025 was submitted at the beginning of December 2023. By the end of January 2024, the EURO Executive Committee was formally informed about the submission of the proposal by the corresponding EURO Vice-president. Later on, by the beginning of July 2024 the EURO Council formally approved the proposal and notified the Organizing Committee that the EPS2025 could be organized.

In the following weeks several actions were taken:

- A Confirmation of invited speakers was requested in view of the preliminary programme submitted for approval.
- A poster was created and distributed in several OR meetings.
- A web page was created (https://europhdschool2025.udl.cat/en/) and permanently updated in order to contain the most relevant up-to-date information.
- A first Call for Papers (CfP) was issued to announce the EPS2025 and distributed among the ORAFM members.

The Institute was advertised:

- The CfP was available in the website of the EPS2025 and also through the website of the EWG-OR in Agriculture and Forest Management (http://www.orafm.org) where all members were kept informed;
- Different mailing lists were contacted to distribute the CfP;

- The editor of the EURO Web site was contacted to announce the EPS2025 on the EURO web site;

Several applications for financial support were submitted:

* University of Lleida, where the main EPS2025 activities were going to be developed.
* Local Administration (city/province council), supporting proposals seeking the international promotion of the city and province of Lleida.

This time the success was rather scarce due to the reduced number of participants expected compared with other international activities organised in the city at the same time.

4. People involved

The EPS2025 was possible to many people involved in the organisation and participation. All of them were taking part in the Scientific Committee or belonging to the final list of laureates or acting as invited lecturers of the EPS2025.

4.1 Committees

Two different committees were considered for the preparation of the EPS2025. A Scientific committee devoted to deal academic questions related with the selection of participants and the management of invitations for invited lecturers. This committee was integrated by the Advisory Board of the EWG-ORAFM related to Agriculture plus the coordinator of the EWG and several reputed researchers invited as speakers and also enrolled in the EWG. In total eleven people took part in this committee whose role was important during the reception and selection of applications.

The Scientific Committee was the following:

Victor Albornoz (Universidad Federico Santamaria, Chile)
Ludovic Brossard (INRAe, France)
Emilio Carrizosa (Universidad de Sevilla, España)
Spyros Fountas (Agricultural University of Athens, Greece)
Jitka Janovà (Mendelu University, Czech Republic)
Dan Børge Jensen (University of Copenhagen, Denmark)
Angel Juan (Universidad Politécnica de Valencia, España)
Alejandro Mac Cawley (Pontificia Universidad Católica, Chile)
José Fernando Oliveira (Universidade do Porto, Portugal)
Lluís M. Plà Aragonès (Universidad de Lleida, España)
Anna Stygar (LUKE, Finland)

The second committee created was the Local Committee that was in truth the organising committee of local activities, both social and academic. The Local Committee was integrated mostly by people from the University of Lleida. The coordinator of the EWG-ORAFM was also part of this committee and acted as bridge between the two committees.

The Local Organizing Committee was the following:

- Pol Llagostera (University of Lleida)

- Adela Pagès (University of Lleida)
- Pau Font (University of Lleida)
- Catalin Doha (University of Lleida)
- Angel Cobo (University of Cantabria)
- Yun Bao (University of Lleida)

The resulting committees were lead by Dr. Plà who coordinated all the actions developed by both committees. The inclusion in the local committee of visiting colleagues and present-future PhD. students was useful to give daily support to the organisation and more specifically to participants and invited lecturers at any moment. They were crucial for the success of the EPS2025.

4.2 Laureates

The deadline for the candidates to apply to the national OR societies was February 2025; the deadline for the national OR societies to notify the Scientific Committee of the ranking of the candidates approved in the corresponding countries was delayed to March the 31st.
Most applications were received directly to the EPS2025 website and many of them from Latin American countries due to the overlap with ELAVIO2025. In total 29 applications were received and forwarded to the Scientific Committee representing 12 countries: Denmark, Pakistan, China, Uruguay, Chile, Colombia, Argentina, El Salvador, México, México, Turkey and Spain.

Four candidates were excluded by the Scientific Committee or declined his/her participation because they were not getting enough financial support. The final list included 25 laureates:

ALEJANDRO GRIMALDO MARTINEZ	MEXICO
ANA SOFIA HENAO MAFLA	COLOMBIA
ANDRÉS MAURICIO PAREDES	COLOMBIA
CANDELA VILLANUEVA	URUGUAY
CARLOS A. MONADES-CONCHA	CHILE
JAVIER ALSÓ PEÑA	URUGUAY
JOHANA PRIAS GARCÍA	COLOMBIA
JUAN IGNACIO ALVAREZ	ARGENTINA
JUAN CARLOS MACHIN LAMARCA	URUGUAY
LEANDRO HERNANDEZ	URUGUAY
RAÚL FERNANDO SOTO CONCHA	CHILE
SALVADOR DE JESÚS VICENCIO	MEXICO
SANTIAGO PÉREZ ANGARITA	COLOMBIA
DIEGO CAMILO CELADA LOZADA	COLOMBIA
FRANCISCO HUGUET	EL SALVADOR
DIEGO ARMANDO MENA MENDOZA	COLOMBIA
LAURA SALCEDO SEPÚLVEDA	COLOMBIA
MARTA MASSA GYLDENKERNE	DENMARK
RICARDO MAURICIO ORTEGA MIPAZ	COLOMBIA
JUAN IGNACIO ALVAREZ	ARGENTINA
PAU FONT	ESPAÑA
IJAZ AL UAQ	PAKISTAN

JOEL SOLANÍ	ESPAÑA
DAVID SANCHEZ	ESPAÑA
YUN BAO	CHINA

In the end, 25 laureates were expected to attend the EPS2025, most of them from Latin America. The Scientific Committee was surprised by not having received applicants from Europe, only Denmark and The Netherlands. The advertising policy of the EPS in Europe was questioned and revised, but it was too late. That was the reason why the organising committee didn't request financial support for the EPS2025 since the Latin American participants had other financial sources and European were supported by regular funds from ORAFM.

4.3 Invited lecturers

The task of selecting invited lectures was a progressive refinement where topics and names lead one to another. A first brainstorming was done by Scientific Committee members where several names and topics of interest arise. These topics were:

- Stochastic Programming
- Dynamic Programming
- Simulation
- Games Theory
- Heuristics
- Forest and fire management
- Decision Graphs
- Supply Chain Management Optimisation
- Multicriteria decision methods
- Artificial Intelligence

Therefore, the Scientific Committee had already in mind several renowned scientists covering some of these topics who were invited to make a high level tutorial during the Institute. Some of initial candidates declined the invitation for several reasons but proposed another colleague of the same research group or of the same level to cover the topic proposed. In the end, invited lectures who accepted the invitation were:

Tander and Filiz Ersöz
Jitka Janova
Laureano Escudero
Antonio Alonso
Dan Jensen
Mario Guajardo
Emilio Carrizosa
Hector Cancela

The program was organised in two mini courses offered in the morning and given the first by Tander and Filiz Ersöz from Turkey and the second by Dan Jensen from Denmark. Six lecturers were invited to cover afternoon sessions. All the invited lecturers were invited to stay in Lleida more than the necessary time to make their presentations to exchange with laureates. This way, it was assured that the laureates could interact with them for several days, exchanging ideas and deepening discussions that hardly could have been taken place during a 1-day visit to the EPS2025. Due to personal reasons Hector

Cancela was near to cancel his presentation since he could not travel as committed. However, the organisation prepare an online presentation allocated in the time slot suggested by Hector.

Furthermore, given the broad background of participants and the wide variety of interests, all keynote speakers were invited to give a speech longer than one hour. The instructions given to them was to prepare a short introduction to the OR methodology they were to present and later on, going ahead with the application. The emphasis was not to introduce very complex concepts but looking for a deeper understanding and involvement of participants. This was revealed very beneficial given the active discussions leading each invited lecture.

5. 'Towards' Lleida for a PhD School

By the end of April all laureates were notified of their selection, the Local Organizing Committee tried to maintain regular contact with them and to make sure that they felt increasingly involved with the EPS. On the other hand the committee offered also support providing letters of acceptation to participants. This was specially requested by non EU-participants needing of VISA.

The web page of the EPS was permanently up-to-date with all the relevant information and venue details. Concerning accommodation, the idea that the laureates shared a room was considered but not possible given available facilities at the Nastasi Hotel (i.e. single rooms).

All participants were arriving the day before starting the EPS. Some of them arrived from Leeds, UK, following the closure of the EURO Conference.

6. Activities

A clear goal of a EURO PhD School is to promote the exchange of scientific knowledge and experience between the laureates and between the laureates and the senior scientists. Another goal is to promote friendship, which can make it easy to raise future cooperation between the laureates. The Local Committee assisted by the Scientific Committee considered these aspects when designing the program of the EPS2025. The parallel organisation of the ELAVIO2025 was a good point.

Additionally, a balanced number of Scientific and social activities were organized. In the next subsections all the activities are described. An overview of the program can be seen in figures 3a) 3b) and 3c).
Lunch breaks were scheduled of one hour and a half. This was more or less respected in Lleida because the restaurant was in the same Campus and the menu was ordered in the morning so the Restaurant collaborated also with the organisation, not only for lunch but also for the coffee breaks. The dinner was free without a specific time except those included in the social program.

Figure 3a): EPS2025 Program overview - second half of week, after EURO Conference.

Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
–				26	27	28	29
09:00-11:00					Mini-Course 1	Mini Talk 2: Antonio	Excursion Calafell Beach
11:00-11:30					*coffe break*	*coffe break*	
11:30-13:30					Mini-Course 1	Mini-Course 1	
14:00-15:30					*lunchtime*	*lunchtime*	
15:30-16:30					Mini Talk 1: Laureano	Mini-Course 1	
16:30-17:00					*coffe break*	*coffe break*	
17:00-18:00					Mini Talk 1: Laureano		
18:00- ...							
20:30-22:00				Welcome Reception			

Figure 3b): EPS2025 Program overview second week.

–	30	1	2	3	4
09:00-11:00	Mini-Course 1	Mini-Course 2	Mini-Course 2	Mini-Course 2	Mini-Course 2
11:00-11:30	*coffe break*	*coffe break*	*coffe break*	*coffe break*	*coffe break*
11:30-13:30	Mini-Course 1	Mini-Course 2	Mini-Course 2	Mini-Course 2	Mini-Course 2
14:00-15:30	*lunchtime*	*lunchtime*	*lunchtime*	*lunchtime*	*lunchtime*
15:30-16:30	Mini Talk 3: Hector	*Free Time: sports & swim*	Mini Talk 4: Jitka	Mini Talk 6: Victor	Mini Talk 7: Mario
16:30-17:00			*coffe break*		*coffe break*
17:00-18:00	*coffe break*		Mini Talk 5: Emilio	*coffe break*	Mini Talk 7: Mario
18:00- ...	Posters		Visit to La Seu Vella	Posters	*free time*
20:30-22:00					Banquet

6.1. Scientific Activities

The scientific activities of the EPS2025 were the following:

- Two mini courses
- The presentation of the laureates' posters;
- Lectures presented by the invited speakers and by members of the Scientific Committee;
- Special discussions and debates;

6.1.1 Posters of the laureates

Each laureate had a slot time of two hours for presenting his/her poster (including time for immediate questions/discussion) upon request of the rest of participants. These presentations referred to the original paper with which they applied to the EPS2025.

The fact that the presentation of posters was held in two slot times made possible to extend the discussions when the schedule permitted or even recover them in other moments of free time since posters were exposed permanently.

6.1.2 Lectures presented by the invited speakers

In the preliminary programme each lecture had allocated one hour (including time for immediate questions/discussion) for presenting a lecture. However, most of the lectures included specific topics requiring more than a basic knowledge in one OR technique. It was expected that laureates would know some of the OR methods, but surely not all of them, neither of AI. So, in the final programme it was considered interesting to request invited speakers to organise his/her speech giving at the beginning a comprehensive introduction about the methodology on which they were going to present the subsequent application. Thus, it was decided to offer an additional slot of time. In the end, invited talks consisted in optional two hours lecture with a break in the middle. Most speakers agreed.

The lectures delivered by the invited speakers at the EURO PhD School 2025 in Lleida offered a coherent and multidisciplinary perspective on the use of optimization and artificial intelligence for decision-making in agriculture, industry, and society. The program naturally began with methodological foundations in optimization under uncertainty, where Laureano Escudero presented advanced distributionally robust optimization models incorporating risk-averse stochastic dominance for multi-stage decision problems, highlighting both theoretical challenges and computational strategies. Closely connected to these themes, Víctor Albornoz introduced decomposition methods such as column generation and Benders decomposition as practical tools to solve large-scale agricultural optimization problems, while Jitka Janovà complemented this methodological focus by addressing the crucial issue of validating optimization models in agriculture and natural resource management, emphasizing credibility, data quality, and structured validation frameworks. Moving from methodological rigor to socially and economically relevant applications, Héctor Cancela illustrated how operations research can be applied for social good through real cases on job assignment for people with disabilities and preference-based housing allocation, and Antonio Alonso discussed classical cutting problems through concrete industrial applications in the steel and cardboard sectors. The integration of optimization with sustainability goals was further developed by Mario Guajardo, who presented decision-support models for cattle farming that jointly consider economic performance and environmental impacts, particularly greenhouse gas emissions. The program then transitioned towards artificial intelligence and data-driven methods, with Emilio Carrizosa addressing the importance of explainable machine learning to ensure transparency and trust in decision-making processes. This perspective was complemented by two hands-on mini-courses: Filiz Ersöz provided a broad overview of machine learning and data mining techniques for analytics, bridging theory and practical implementation, while Dan Børge Jensen focused on convolutional neural networks with concrete applications in precision livestock farming. Altogether, the invited lectures formed a logically connected narrative, moving from advanced optimization theory and validation, through applied decision models and sustainability, to modern machine learning techniques, illustrating how these approaches jointly contribute to intelligent and responsible decision-making in agriculture and related domains. Finally, the lecturers as well as the corresponding titles of the lecture were the following:

Lecturer	Title of Lecture / Mini-Course
Dr. Filiz Ersöz	*Machine Learning and Data Mining for Business Analytics* (Mini-course)
Dr. Dan Børge Jensen	*Convolutional neural networks* (Mini-course)
Dr. Héctor Cancela	*Operations research for social good: job assignment for people with disabilities and preference based unit assignment in cooperative housing*
Dr. Jitka Janovà	*Validation of Optimization Models in Agriculture and Natural Resources*
Dr. Víctor Albornoz	*Decomposition methods as a problem-solving strategy in agriculture*
Dr. Emilio Carrizosa	*Explainable Machine Learning for Explainable Decision Making*
Dr. Laureano Escudero	*On distributionally robust optimization with stochastic dominance risk averse functional in multi-horizon problems under uncertainty*
Dr. Antonio Alonso	*An Introduction to Cutting Problems and two real applications in the cardboard and Steel industries*
Dr. Mario Guajardo	*Optimizing cattle farms: Economic and environmental criteria*

6.1.3 The two mini courses

The two mini-courses at the EURO PhD School 2025: *Convolutional Neural Networks* taught by Dr. Dan Børge Jensen and *Machine Learning and Data Mining for Business Analytics* delivered by Prof. Dr. Filiz Ersöz, provided participants with both deep technical foundations in modern machine learning and an applied perspective on how these tools support decision-making across domains to connect predictive modelling with organizational and research analytics.

Dr. Dan Børge Jensen, an Associate Professor at the Department of Veterinary and Animal Sciences, University of Copenhagen, specializes in quantitative and data-intensive methods for livestock systems and precision livestock farming, with a substantial research record in applying dynamic models and machine vision techniques including convolutional neural networks to real-world animal production problems such as monitoring and behaviour analysis in pigs and other livestock. His mini-course introduced convolutional neural networks (CNNs) with hands-on exercises using R and deep learning frameworks like TensorFlow and Keras, focusing on how CNN architectures learn hierarchical image features and how they can be applied to tasks such as animal counting and classification in precision livestock applications. By grounding the course in both algorithmic principles and practical examples from animal science, the session equipped doctoral students to link theory with applied research contexts.
In contrast, Prof. Dr. Filiz Ersöz's mini-course concentrated on machine learning and data mining methods for business analytics, reflecting her extensive academic and professional career rooted in statistics, data science, and decision support. Currently a professor with a strong publication record (over 100 peer-reviewed articles and several authored books) and a long history of teaching and research in statistical learning, simulation, and predictive analytics, Dr. Ersöz's work spans data mining, machine learning, statistical software applications, and optimization, making her particularly well-suited to guide students through the practical and conceptual underpinnings of data-driven modelling. Her mini-course exposed participants to the core techniques of data mining and machine learning, including supervised and unsupervised methods, evaluation

metrics, and software tools, framed within the context of business decision support and analytical problem solving.

6.2. Social Activities

The social activities in a EURO PhD School are an essential component to make sure that strong links will emerge amongst the laureates and also between the laureates and the lecturers.

The social activities scheduled for the EURO PhD School 2025 included a variety of activities cultural, educational and sportive:

- Welcome reception
- Visit to the "Seu Vella" and "Suda" (Main attraction of Lleida);
- Special lunch
- Excursion to the beach;
- Cultural visit of Roman ruins of Tarragona: Imperial Tarraco;
- Sports and swim
- EPS2025 banquet;
- City tour (Lleida);
- Closure party of the EPS2025;

6.2.1 Welcome reception

Given the different times of arrivals and the number of people was considered difficult to organise such a reception. Several participants wanted to spend a day in Barcelona or Madrid, others not. Thus, the initial idea of a welcome reception was the meeting poit for everybody to start the EPS2025. The invited speakers present at that moment were also invited to taste some typical dishes in the reception room, the same place where the closure of EPS2025 was going to be celebrated. None of them would be at this closure, so it was a consideration from the organisation. The registration and material included handing out the documentation, a folder, maps and badges. Some members of the local committee were also hosted at the same Hotel as participants. There was always one of them available for any matter affecting participants and/or lecturers at any time. Their role was very important and appreciated.

6.2.2 Visit to the "Seu Vella" and "Suda" (Main attraction of Lleida)

On Wednesday 2nd July was the visit to the "Seu Vella". Prior to that, on the way on foot, it was visited the "Paeria", i.e. the city hall and the museum hosted in the basement of the "Paeria". The term "paer" is derived from the Latin "patiari" meaning "man of peace", and dates back to the privilege granted by King James I in 1264. The building has a double facade: one overlooks the Paeria square and is built in the civil Romanesque style, while the other neoclassical facade, with a neo-mediaeval refurbishment dating from 1929, faces the River Segre. The result is a perfectly balanced construction. The building was built in the early 13th century, and in 1383 the owners, the Lords of Sanaüja, donated it to the city as the seat of municipal government. Today the Paeria houses numerous treasures reflecting the city's identity like Roman and Arabic ruins, witnesses of the past history of Lleida.

The Seu Vella is the most outstanding building at the monumental complex that bears its name and its silhouette, the skyline of the city. It is the old cathedral of Lleida that was used as fortress for three centuries and recovered last century as monument for the city

(part of the world heritage by UNESCO). Defined as one of the best artistic productions of 13th century Catalan architecture and, by extension, of European medieval architecture, the Seu Vella is a singular cathedral that leaves no one indifferent. Its architecture shares the limelight with high quality carvings that are preserved in capitals, cornices, corbels, portals, etc. The substantial remains of preserved mural paintings or the chapels built by prominent families or distinguished church members are a reflection of a prestigious building with a splendid past. Sobriety, grandeur and magnificence are some of its attributes. However, there are many more to discover. For instance, the climbing to the top of the clock tour (by a stair of 264 narrow steps) was an adventure shared by the group. They got on top a final reward in terms of an impressive view of the city and the surroundings.

The Castle of the King or "Suda" is located on the top of the hill. The popular name of Suda is an Arabic word which means a closed urban area. The Suda name referred to the Andalusian fortress built during the 9th century on the site now occupied by the Castle of the King. It was the palace where the king resided during his stay in Lleida. Its construction reflects different phases between the late 13th and 14th century, which is why Romanesque and Gothic forms coexist. At these periods, it was the most remarkable civil building in the city and an important centre for political decisions. Its walls were the scene of momentous events in the history of Catalonia and the Kingdom of Aragon. In addition to the various courts that were held, some of the most prominent acts were most likely the marriage between Petronila of Aragon and Ramon Berenguer IV, Count of Barcelona, in 1150; the recognition of James I as king in the Courts of 1214; or the imprisonment of Charles, Prince of Viana by his father, John II, in 1460.

6.2.3 Sports and swim

On Tuesday, July 1st, a sports and swimming day was organized. First, after lunch was served at Tennis Lleida, the club made its sports facilities available to the EPS2025 organization. The EPS2025 participants first cooled off in the pool and then went to the football field for a friendly game. They spent a relaxing afternoon and, when the activities were over, walked back to the hotel, which was not far from the tennis club.

6.2.4 Special lunch

The program extended into the weekend, with Saturday morning devoted to a couple of mini-course sessions and an invited lecture. For this reason, the organization decided to hold a special meal at the hotel and offer participants the chance to enjoy typical Catalan cuisine. The meal took place in a private room where the banquet and closing party would also be held on the last day. After the meal, participants were given free time to rest if they wished, as the following day promised to be an intense one with visits to Tarragona and the beach.

6.2.5 Excursion to the beach

On Sunday 29th June an excursion to the beach of Tarragona was proposed and accepted by most of the laureates. The organisation provided a bus to get one of the nearest beaches to Lledia. The day was sunny and all people were back in the evening. Before reaching the beach, a cultural visit to the ruins of Imperial Tarraco was done. We visited different places where the different layers of modern-day Tarragona overlap with monumental remains from ancient Roman times, such as the Roman circus and the amphitheater with its tiers of seats facing the sea. We walked where the Roman forum once stood and the site of the temple that is now occupied by the city's cathedral. We were accompanied by

a tour guide who introduced us to the historical and architectural aspects of the places we visited in the city. At the end of the tour, we headed to the beach to take a nice swim, cool off, and for some of us, get a little sunbath.

When lunchtime arrived, the participants were taken back to Lleida to enjoy a meal together at a rather unusual restaurant: Bon Area. It was a buffet-style restaurant where people could cook their own meat on the grill and sample other ready-made dishes in addition to the typical salads. Honestly, it was a great way to end the cultural and recreational day we had enjoyed. We arrived back at the hotel around six in the afternoon.

6.2.6 EPS2025 banquet and closure party

This activity was proposed to be held on Friday 4th evening, just at the end of the EPS2025 in Lleida. It is worthy to note the enthusiasm of several laureates who were willing to attend the banquet and ready to take part in subsequent closure party with music and dancing. The dinner took place in the Nastasi Hotel, the same private room we had used for the lunch on Saturday. It started at 20:30 and everybody was surprised by the quality of the traditional dishes offered.

The service was excellent, with waiters speaking English and making easier the ordering of dishes. At 21:00 was starting the banquet after having some drink. As starter there was a sample of typical cuisine of Catalonia before the main curse that everyone could choose. On the other hand, the banquet was very emotional in the end because participants wanted to thank the organisation of EPS2025 and there were talks and thanks giving in all senses. It was a sample of the hopes of going on touch after the end of EPS2025.

After the banquet some people went to rest and other to have fun in a room apart, with music and drink which motivated people to dance while continuing to chat in a very welcoming atmosphere. The party ended around 2 a.m., and there were few people left, as the most tired had gone back to their rooms, since most were leaving to return to their hometowns the next day.

7. Outcomes

The main outcome of the EPS2025 is the friendship generated among participants. This could lead to fruitful collaborations. For instance, to explore the preparation of a COST action was also considered among some keynote speakers and participants. Other Latin American participants had also considered the possibility to plan his/her doctoral stages abroad and explore options with invited speakers and with the organisation.

On the other hand, laureates were informed about the edition of two Special Issues in Annals of Operational Research closely aligned with the scientific themes of the school, as advertised on its official website. Both special issues are intended to collect high-quality methodological and applied contributions in operations research. The first special issue, entitled *Stochastic Optimization in Agriculture*, focuses on models, algorithms, and real-world applications of stochastic optimization to agricultural decision problems under uncertainty, reflecting one of the core scientific pillars of the school; it is guest edited by Ana Paula Barbosa (Instituto Superior Técnico, Lisbon) and Lluís Miquel Plá (University of Lleida, Lead Guest Editor), with a submission deadline of 31 October 2025. The second special issue addresses *Operations Research and Operations Management Models for Food Loss and Waste Reduction*, inviting contributions that develop quantitative

decision-support models aimed at improving efficiency and sustainability across food supply chains. This issue is edited by an international team comprising Celso C. Ribeiro (Universidade Federal Fluminense, Brazil, Lead Guest Editor), Héctor Cancela (Universidad de la República, Uruguay), Lluís Miquel Plá (University of Lleida, Spain), Xiaohang Yue (University of Wisconsin–Milwaukee, USA), and Baofeng Zhang (China Agricultural University, China), with a submission deadline of 30 November 2025. These two special issues provide a concrete publication outlet for research inspired by the PhD School, reinforcing its objective of fostering rigorous, impactful contributions in stochastic optimization, sustainability, and operations research applied to agriculture and food systems.

Finally, it was agreed by all participants to make efforts to meet each other again in next IFORS Conference in Vienna 2026 or in the CLAIO 2026 in Bogotá. Exploring alternatives for repeating this or similar experiences for not loosing the contact and increase the visibility of the group was as well accepted.

8. Budget report: supports and expenses

The original budget presented at EURO was:

Incomes:

- EURO (15000€)
- Fee: 30x450 = 13,500 €
- Others: 20,000€

Expected expenses:

- Accommodation and Food: Participants: 30x500=15,000 €
- Speakers: 14x500=7,000 €
- Travel Expenses of Speakers: 14x1500=21,000€
- Committee's Expenses 1,500€
- Social Programme 4,000 €

In the end, few EURO laureates were taking part in the EPS2025 and most of the participants were Latin American. In total these were six Master or PhD students enrolled in Danish or Spanish Universities and seven EU-invited speakers. We are very grateful to most of the invited speakers who covered their own travel expenses alleviating the expenses of the EPS2025. Therefore, the final results regarding only EURO participants (from Denmark and Spain, plus invited speakers):

Incomes:

- EWG ORAFM 2000,00€

Expenses:

- Accommodation and Food: Participants & Speakers: 1,5000 €
- Travel Expenses of Speakers: 500€

Total: 2,000.00€

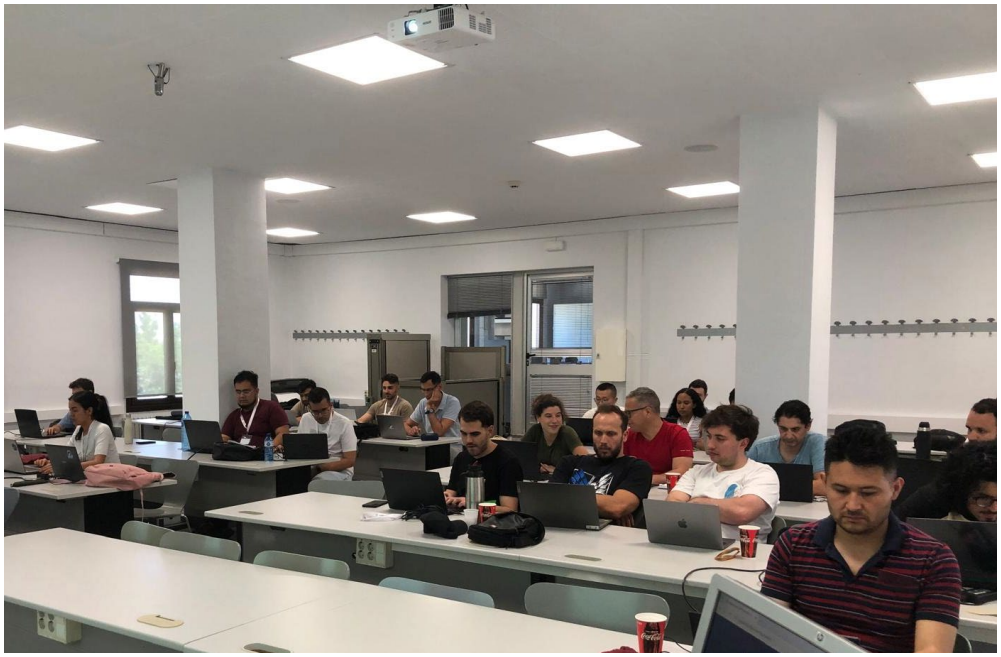
9. Conclusion

The final assessment of the EURO PhD School 2025 is highly positive and confirms it as a very rewarding experience for participants, lecturers, and the organizing team alike. The strong engagement of the PhD students and early-career researchers, together with the active involvement of the invited speakers, clearly reflected the relevance and timeliness of the topics addressed during the school, spanning optimization, artificial intelligence, and their applications to agriculture, food systems, and sustainability. The discussions highlighted a shared interest in strengthening methodological depth, particularly in stochastic optimization, decomposition techniques, validation of models, and explainable machine learning; while also reinforcing the need for interdisciplinary meeting points where operations research and data-driven approaches can jointly address real-world challenges. Informal feedback from participants revealed a clear willingness to continue and deepen this experience in future editions, underlining the value of the school as a forum for scientific exchange, training, and networking within the EURO community in narrow relationship with the Latin American counterpart, ALIO. The organizing committee would like to sincerely thank the EURO Executive Committee for the trust placed on them and for the opportunity to prepare and host an event that has proven enriching on scientific, educational, and human levels.

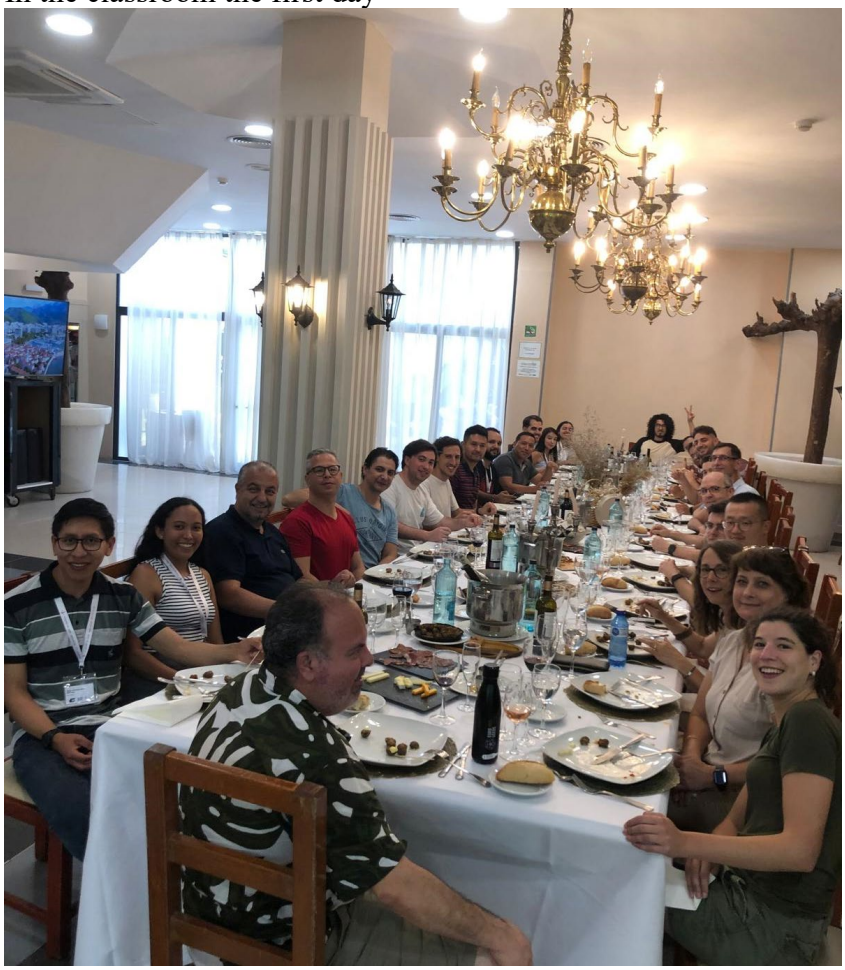
Many thanks.

On behalf of the organising committee.
L.M. Plà
Chair.

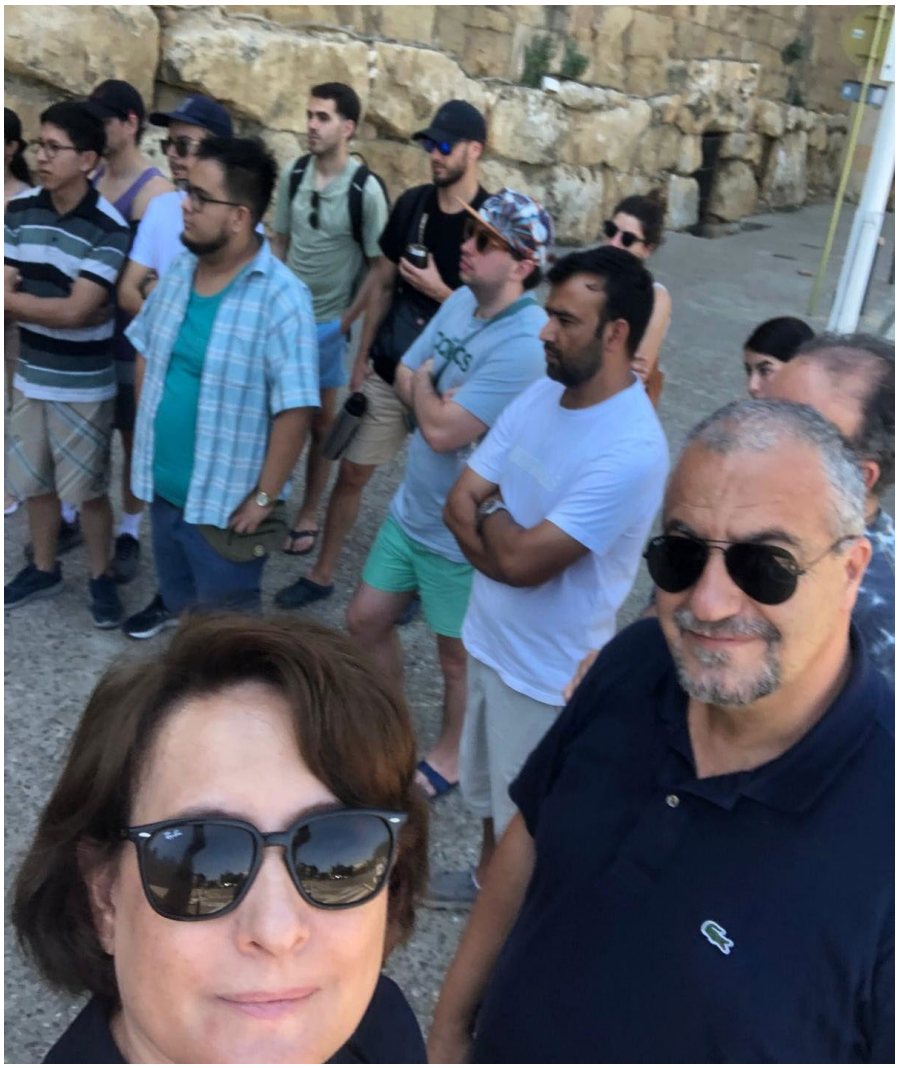
Appendix 1. Some Pictures



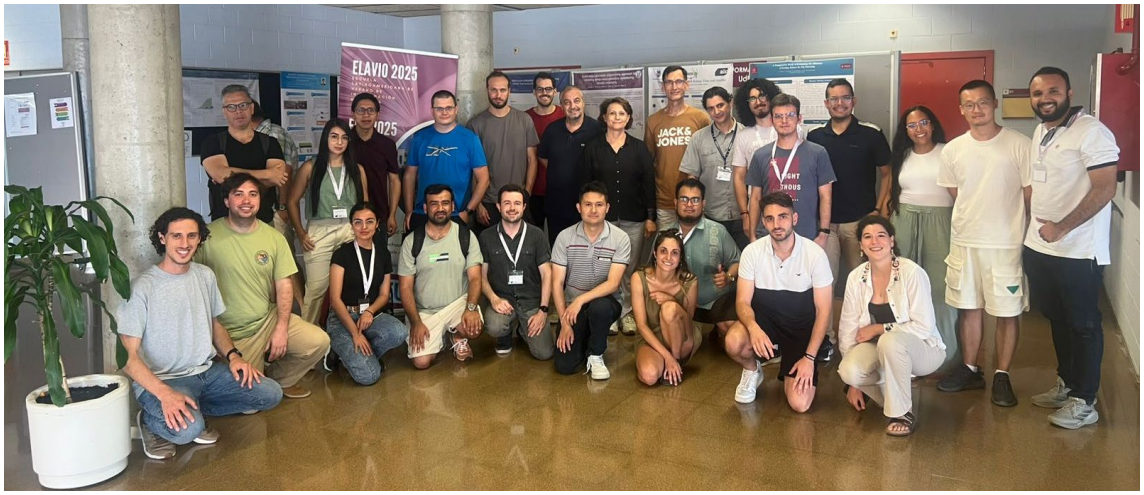
In the classroom the first day



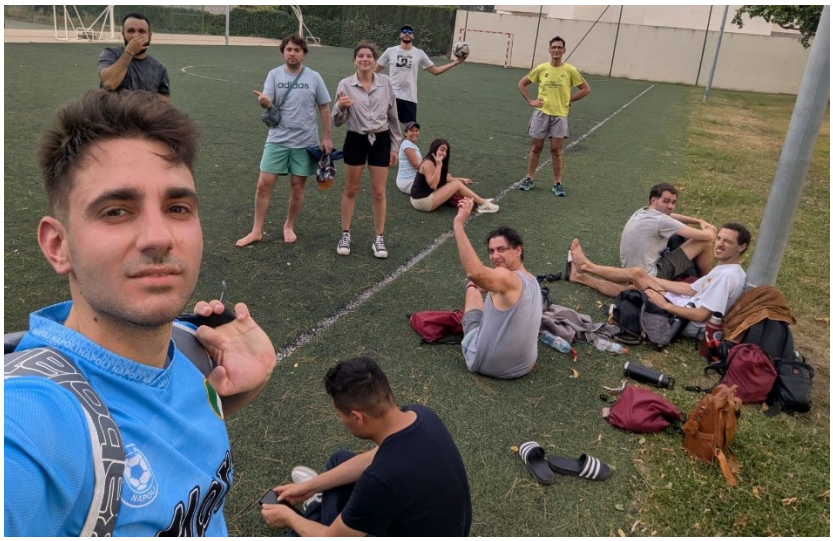
The Saturday lunch, after an exhausting morning of work



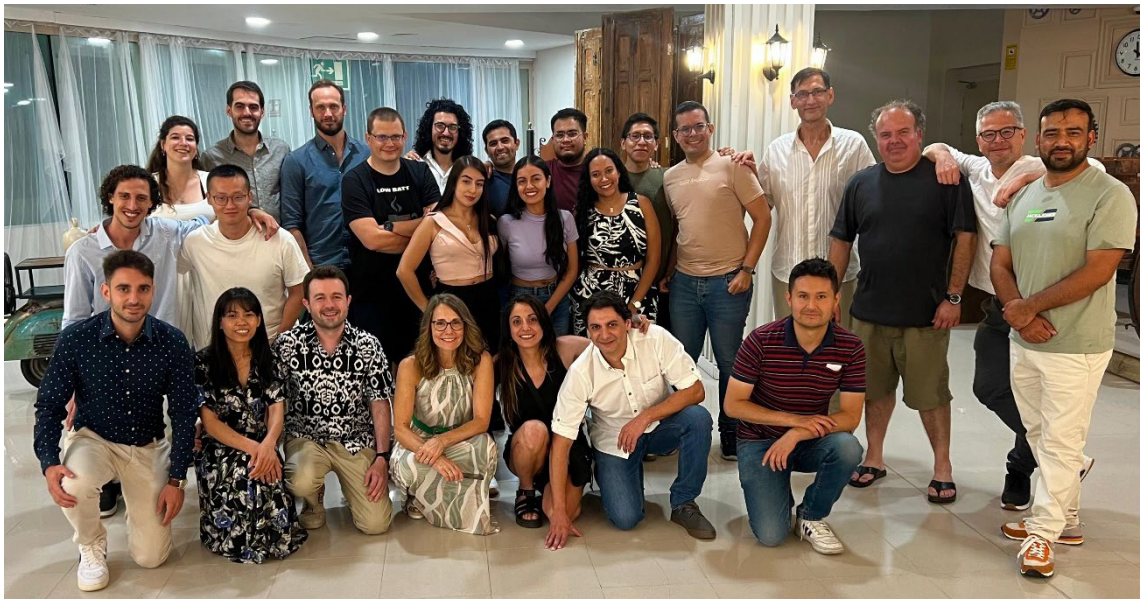
Visiting Tarragona with a tour guide



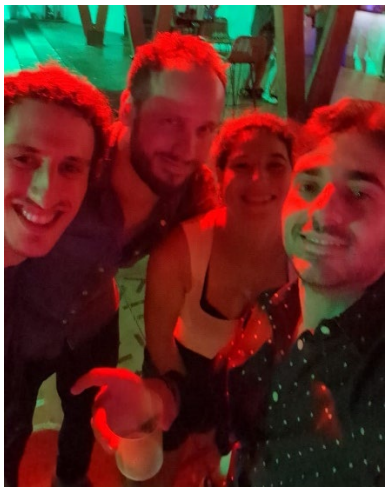
After the poster session



An sportive afternoon in a swimming pool and later a mini football match

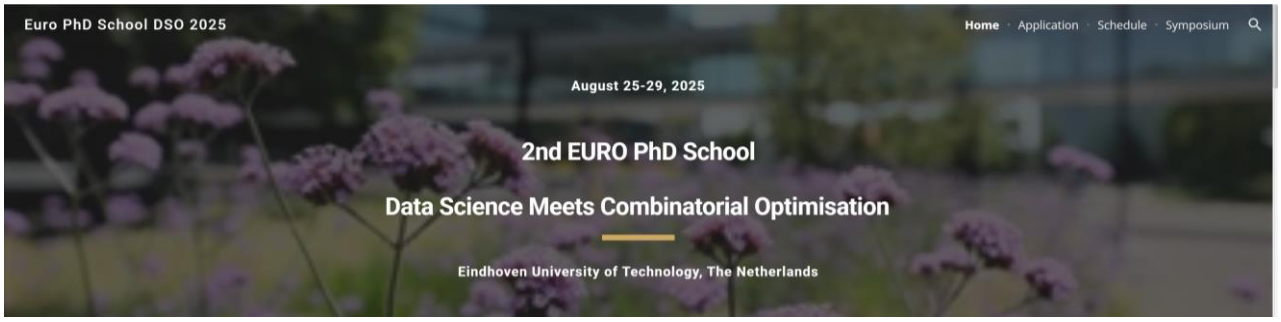


The picture after the banquet

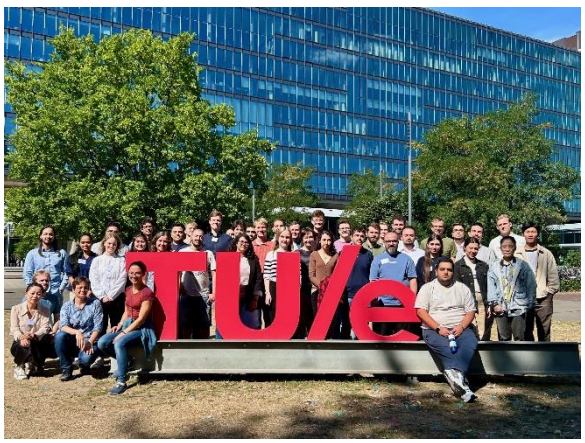


Having fun at Lleida night

The 2nd EWG/DSO EURO PhD School "Data Science Meets Combinatorial Optimisation"
Eindhoven University of Technology, The Netherlands



Yingqian Zhang: yqzhang@tue.nl
Patrick De Causmaecker: patrick.decausmaecker@kuleuven.be



Organized by the EURO working group DSO "Data Science meets Optimization", the second EURO PhD school (https://sites.google.com/view/phd-school-dso-2025) was held at Eindhoven University of Technology, from 25 August to 29 August.

The PhD school welcomed over 40 PhD candidates, from 30 universities over 9 countries, to explore the interface between data science, machine learninig, and combinatorial optimization.

Combinatorial optimisation problems (COPs) are often NP-hard. Recent advances in machine learning (ML) have begun transforming how these problems are addressed, by identifying patterns in problem instances, predicting algorithm performance, and learning to generate high-quality solutions. At the same time, optimisation techniques play a key role in making AI systems more transparent, robust, and fair. The school's primary goal was therefore to equip early career researchers with state-of-the-art integrated methods and tools from both fields, and create networking opportunities for future collaboration. Over five days, participants engaged in a combination of lectures**,** hands-on exercises and student presentations.

Day 1: Black-Box Optimisation & Student Presentations

Professor Carola Doerr from Sorbonne University opened the school with a lecture on Black-Box Optimisation. In the afternoon, Dr. Diederick Vermetten (Sorbonne University) led a hands-on lab where students implemented algorithms on benchmark problems and competed in an MA-BBOB challenge. Afterwards, five PhD students presented their own research.