

PRIMA2019

The 22nd International Conference
on Principles and Practice of Multi-Agent Systems

Torino, Italy | October 28th - 31st, 2019



Conference Booklet

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Conference Committee

Conference Chairs

Matteo Baldoni (University of Torino, Italy)

Yuko Sakurai (AIST, Japan)

Program Chairs

Mehdi Dastani (Utrecht University, The Netherlands)

Beishui Liao (Zhejiang University, China)

Rym Zalila-Wenkstern (The University of Texas at Dallas, USA)

Social-Science Track Chair

Michael Mäs (University of Groningen, The Netherlands)

Workshop and Tutorial Chairs

Cristina Baroglio (University of Torino, Italy)

Francesco Olivieri (DATA61 | CSIRO, Australia)

Financial, Sponsorship and Local Arrangement Chair

Roberto Micalizio (University of Torino, Italy)

Web Chair

Stefano Tedeschi (University of Torino, Italy)

Program-at-glance

	OCT. 28 th		OCT. 29 th	OCT. 30 th	OCT. 31 st	
8:30-9:00	Registration Exterior Gallery		Registration Exterior Gallery		Registration Exterior Gallery	
9:00-9:30			Opening Aula Magna		Session IV Aula Magna	
9:30-10:00	AgentCrowd Aula Magna		Session I Aula Magna	Tutorial T1 Sala Principe d'Acaja		
10:00-10:30						
10:30-11:00						
11:00-11:30	Coffee Break Exterior Gallery		Coffee Break + Posters Exterior Gallery	Coffee Break + Posters Exterior Gallery	Coffee Break + Posters Exterior Gallery	
11:30-12:00	AgentCrowd Aula Magna		Session II Aula Magna	Tutorial T2 Sala Principe d'Acaja	Invited Talk Ugo Pagallo Aula Magna	Fabio Bellifemine's Legacy Aula Magna
12:00-12:30						
12:30-13:00						
13:00-13:30	Lunch			Lunch	Lunch	
13:30-14:00						
14:00-14:30	Lunch				Session V Aula Magna	
14:30-15:00						AgentCrowd Aula Magna
15:00-15:30						
15:30-16:00						
16:00-16:30	Coffee Break Exterior Gallery		Session III Aula Magna		Coffee Break + Posters Exterior Gallery	Closing Aula Magna
16:30-17:00	AgentCrowd Aula Magna	AgAmb + A2HC Sala Principe d'Acaja			Session VI Aula Magna	
17:00-17:30						
17:30-18:00						
18:00-18:30						
18:30-20:00	Welcome reception Caffè Fiorio					
20:00-21:00					Social Dinner Eataly Torino Lingotto	
21:00-22:30						

The "Aula Magna" and the "Sala Principe d'Acaja" rooms, and the exterior gallery are located in the historical Rectory building of the University of Torino.

Workshops

AgentCrowd2019: Agent-based Crowd Decision-making

"Aula Magna" room

October 28th, 2019 | 9:30-18:00

AgAmb: Agents and Ambient Intelligence

"Sala Principe d'Acaja" room

October 28th, 2019 | 14:30-18:00

A2HC: Agents Applied in Health Care

"Sala Principe d'Acaja" room

October 28th, 2019 | 14:30-18:00

The AgAmb and A2HC workshops will be co-located in a half-day event that will be held in the afternoon of October 28th, 2019.

Tutorials

T1: Multi-Agent Oriented Programming to engineer complex intelligent systems

Olivier Boissier, Rafael H. Bordini, Jomi F. Hübner, Alessandro Ricci

"Sala Principe d'Acaja" room

October 29th, 2019 | 9:30-11:00

T2: Automated Negotiation: Challenges and Tools

Yasser F. O. Mohammad

"Sala Principe d'Acaja" room

October 29th, 2019 | 11:30-13:00

Detailed Program

All sessions of the Main Track will take place in the "Aula Magna" room.

Session I - Learning and Negotiation (October 29th | 9:30-11:00)

Chair: Son Tran

Full papers:

- MCTS-based Automated Negotiation Agent
Cédric Buron, Zahia Guessoum and Sylvain Ductor
- Supply Chain Management World: A benchmark environment for situated negotiations
Yasser Mohammad, Enrique Areyan Viqueira, Nahum Alvarez Ayerza, Amy Greenwald, Shinji Nakadai and Satoshi Morinaga
- Modelling Shared Decision Making in Medical Negotiations: Interactive Training with Cognitive Agents
Volha Petukhova, Firuza Sharifullaeva and Dietrich Klakow

Short papers:

- Compact Frequency Memory for Reinforcement Learning with Hidden States
Hüseyin Aydın, Erkin Çilden and Faruk Polat
- Coordination in Collaborative Work by Deep Reinforcement Learning with Various State Descriptions
Yuki Miyashita and Toshiharu Sugawara

Session II - Argumentation (October 29th | 11:30-13:00)

Chair: Makoto Yokoo

Full papers:

- A Distributed and Clustering-based Algorithm for the Enumeration Problem in Abstract Argumentation
Sylvie Doutre, Mickaël Lafages and Marie-Christine Lagasquie-Schiex
- Decidable Verification of Agent-Based Data-aware Systems
Francesco Belardinelli and Vadim Malvone
- Dynamic multi-agent systems: conceptual framework, automata-based modelling and verification
Rodica Condurache, Riccardo De Masellis and Valentin Goranko

Short papers:

- Deception/Honesty Detection and (Mis)trust Building in Manipulable Multi-Agent Argumentation: an Insight
Ryuta Arisaka, Makoto Hagiwara and Takayuki Ito

- Semantics of extended argumentation frameworks defined by renovation sets
Hengfei Li and Jiachao Wu
- Block Argumentation
Ryuta Arisaka, Francesco Santini and Stefano Bistarelli

Session III - Games & Economics (October 29th | 16:00-18:30)

Chair: Francesco Olivieri

Full papers:

- Non monotonic collective decisions
Matteo Cristani, Francesco Olivieri and Guido Governatori
- SAT-Based Automated Mechanism Design for False-Name-Proof Facility Location
Nodoka Okada, Taiki Todo and Makoto Yokoo
- A Coalitional Algorithm for Recursive Delegation
Juan Afanador, Nir Oren and Murilo Baptista
- Solving Coalition Structure Generation Problems over Weighted Graph
Emi Watanabe, Miyuki Koshimura, Yuko Sakurai and Makoto Yokoo

Short papers:

- Computational Complexity of Hedonic Games on Sparse Graphs
Tesshu Hanaka, Hironori Kiya, Yasuhide Maei and Hirotaka Ono
- Leveraging Symmetric Relations for Approximation Coalition Structure Generation
Narayan Changder, Aknine Samir and Animesh Dutta
- Imperfect Information in Alternating-time Temporal Logic on Finite Traces
Francesco Belardinelli, Alessio Lomuscio, Aniello Murano and Sasha Rubin
- Deep False-name-proof Auction Mechanisms
Yuko Sakurai, Satoshi Oyama, Mingyu Guo and Makoto Yokoo

Session IV - Simulation & Agent Modelling (October 30th | 9:00-11:00)

Chair: Marcia Pasin

Full papers:

- A Co-Evolutionary Approach to Analyzing the Impact of Rationality on the Italian Electricity Market
Célia da Costa Pereira, Sara Bevilacqua, Eric Guerci, Frederic Precioso and Claudio Sartori
- Selfish Mining in Proof-of-Work Blockchain with Multiple Miners: An Empirical Evaluation
Tin Leelavimolsilp, Viet Nguyen, Sebastian Stein and Long Tran-Thanh

- A Scheduler for Smart Homes with Probabilistic User Preferences
Van Nguyen, William Yeoh, Tran Cao Son, Vladik Kreinovich and Tiep Le
- Coordination of Mobile Agents for Simultaneous Coverage
Petra Mazdin and Bernhard Rinner

Short papers:

- Strategies for Energy-Aware Multi-Agent Continuous Cooperative Patrolling Problems subject to Requirements
Lingying Wu and Toshiharu Sugawara
- A Combined Netflow-driven and Agent-based Social Modeling Approach for Building Evacuation
Julie Dugdale, Mahyar Tourchi Moghaddam, Henry Muccini and Hrishikesh Narayanankutty
- SPSC: a new execution policy for exploring discrete-time stochastic simulations
Yu-Lin Huang, Gildas Morvan, Frédéric Pichon and David Mercier
- An Adaptive Cognitive Agent Model for Development of a Hoarding Disorder and Recovery from it by Therapy
Alex Italiaander and Jan Treur

Session V - Logic (October 30th | 14:00-16:00)

Chair: Huimin Dong

Full papers:

- Integrating CP-nets in Reactive BDI Agents
Mostafa Mohajeriparizi, Giovanni Sileno and Tom van Engers
- Doxastic Group Reasoning via Multiple Belief Shadowing
Barbara Dunin-Keplicz, Inga Rüb and Andrzej Szalas
- Automating Agential Reasoning: Proof-Calculi and Syntactic Decidability for STIT Logics
Tim Lyon and Kees van Berkel

Short papers:

- Estimating Missing Environmental Information by Contextual Data Cooperation
Davide Andrea Guastella, Valérie Camps and Marie-Pierre Gleizes
- TAMER: Task Allocation in Multi-Robot Systems Through an Entity-Relationship Model
Branko Miloradovic, Mirgita Frasher, Baran Cürüklü, Mikael Ekström and Alessandro Vittorio Papadopoulos

- Explainable ASP
J  r  mie Dauphin and Ken Satoh
- DyNeMoC: Statistical Model Checking for Agent Based Systems on Graphs
Yenda Ramesh, Nikhil Anand and M. V. Panduranga Rao

Session VI - Social/Cognitive Modelling (October 30th | 16:30-18:30)

Chair: Guido Governatori

Full papers:

- Usefulness of Information for Goal Achievement
Laurence Cholvy and C  lia Da Costa Pereira
- K-ACE: a Flexible Environment for Knowledge-Aware Multi-Agent Systems
Stefania Costantini and Valentina Pitoni
- New Distributed Constraint Reasoning Algorithms for Load Balancing in Edge Computing
Khoi D. Hoang, Christabel Wayllace, William Yeoh, Jacob Beal, Soura Dasgupta, Yuanqiu Mo, Aaron Paulos and Jon Schewe
- Deliberation towards transitivity with unshared features
Arthur Boixel, Pierre Bisquert and Madalina Croitoru

Short papers:

- A Modeling Environment for Reified Temporal-Causal Networks Modeling Plasticity and Metaplasticity in Cognitive Agent Models
Jan Treur
- The Choice Between Bad and Worse: A Cognitive Agent Model for Desire Regulation under Stress
Nimat Ullah and Jan Treur
- Modeling Higher-Order Adaptive Evolutionary Processes by Multilevel Adaptive Agent Models
Jan Treur
- Learning to Explain Anger: An Adaptive Humanoid-Agent for Cyber-Aggression
Fakhra Jabeen, Jan Treur and Charlotte Gerritsen

Session VII - Norm & Organization (October 31st | 9:00-11:00)

Chair: Ken Satoh

Full papers:

- Subset Spaces for Conditional Norms
Huimin Dong, R Ramanujam and Yi N. W  ng
- Formal analysis of responsibility attribution in a multimodal framework
Daniela Glavani  ov   and Matteo Pascucci

- Identifying Belief Sequences in a Network of Communicating Agents
Gauvain Bourgne, Yutaro Totsuka, Nicolas Schwind and Katsumi Inoue
- From good intentions to behaviour change: Probabilistic Feature Diagrams for Behaviour Support Agents
Malte S. Kließ, Marielle Stoelinga and M. Birna van Riemsdijk

Short papers:

- Self-Vehicle Positioning Using Smart Infrastructures
Assia Belbachir and Marcia Pasin
- Emergent Privacy Norms for Collaborative Systems
Onuralp Ulusoy and Pinar Yolum
- Smart RogAgent: where Agents and Humans Team Up
Chiara Capone, Rafael H. Bordini, Viviana Mascardi, Giorgio Delzanno, Angelo Ferrando, Luca Gelati and Giovanna Guerrini
- Ubiquitous computing and multi-agent systems: clarification of the lexicon
Nathan Aky, Denis Payet, Sylvain Giroux and Rémy Courdier

Session VIII - Social-science Track (October 31st | 14:00-16:00)

Chair: Michael Mäs

Full papers:

- Comparison of Behaviors of Actual and Simulated HFT Traders for Agent Design
Masanori Hirano, Kiyoshi Izumi, Hiroyasu Matshushima and Hiroki Sakaji
- Representation, Justification and Explanation in a Value Driven Agent: An Argumentation-Based Approach
Beishui Liao, Michael Anderson and Susan Leigh Anderson
- Housing Market Agent Based Simulation with Loan-To-Value and Debt-To-Income
Tae-Sub Yun and Il-Chul Moon
- Impacts of consensus protocols and trade network topologies on blockchain system performance
Xianhua Wei, Aiya Li and Zhou He

Full papers will be provided with a **20 minutes** presentation slot, including questions.

Short papers will be provided with a **10 minutes** presentation slot, including questions.

Invited Talks

Rules of Social Nature for MAS

"Aula Magna" room

October 29th, 2019 | 14:30-15:30

Chair: Mehdi Dastani

For many years people have been using norms to create flexible regulations for the interactions between agents in MAS. Just like concepts from human psychology and biology have been inspirational for the modelling of agent reasoning and evolution of MAS, we have drawn inspiration from social science to model concepts such as norms. However, they have been quite resistant to any kind of uniform representation and/or use. Moreover, other social mechanisms (such as conventions, practices, etc.) exist that can regulate social behaviour. In this presentation, I will discuss the reasons for the inherent difficulties to model and implement all these concepts in a uniform way. Based on this analysis I will indicate in which kind of situations each of these types of social rules can be most useful and describe some first steps towards a methodology for using them properly for MAS.



Frank Dignum is Professor of Socially Aware AI at Umeå University, Sweden and associated with Utrecht University in The Netherlands and the Czech University of Technology in Prague. He is a fellow of the European Artificial Intelligence Association (EURAI). He has been active in the field of Multi-Agent Systems and Social Simulations for 30 years. He has not only published in the most important conferences in AI, but also actively organized major conferences such as AAMAS and ECAI, besides many specialized workshops. His main research interests have been in social aspects of MAS. He has made major contributions in the formalization and implementation of norms for MAS, but also has looked at the role of communication in MAS. In the last few years he has published about the use of culture, values and norms in agent based social simulations.

Law, Ethics, and the Governance of AI

"Aula Magna" room

October 30th, 2019 | 11:30-12:30

Chair: Beishui Liao

In order to boost investment and define ethical guidelines in the field of Artificial Intelligence (AI), the European Commission set up three different groups of experts, or 'HLEG,' on 25 April 2018. They focus on (i) the ethics of AI; (ii) possible amendments to the directive on liability for defective products; and, (iii) a general framework for liability and new technologies formation. In light of the documents and reports of such HLEGs, the aim of this paper is to grasp how these proposals may fit different forms of legal regulation and governance. A first option is to consider the ethical principles of current declarations and guidelines as the principles that will be embraced and enforced through the top-down tools of the law. A second possibility is to conceive the work of such HLEGs as the way in which we should complement and strengthen existing regulations. A third prospect has to do with further forms of governance and legal regulation, such as the EU model of co-regulation in the field of data protection, which should be contemplated in addition, or as an alternative, to the top-down approaches of the previous stances. A final choice regards the context-dependency of the issues we're dealing with, in both the fields of applied ethics and legal regulation, so that focus should be on the specific normative challenges brought about by, say, self-driving cars, drones, robot doctors, and the like. As a result of these multiple options, it follows that current discussions on the regulation of AI do not only regard the set of rules, values, principles, standards, protocols, or guidelines that should govern it. We also have to take sides in the kind of governance model, within which such rules, values, principles, etc. should operate.



A former lawyer and professor of Jurisprudence at the Department of Law, University of Turin (Italy), Vice President of the Italian Association of Legal Informatics, **Ugo Pagallo** is Faculty at the Georgetown's Law School transnational center in London, UK (CTLs), and member of the Expert Group set up by the EU Commission on liability and new technology/new technologies formation. Ugo is also chairing the 2019 AI4People project, namely the first global forum in Europe on the Social Impacts of Artificial Intelligence set up by the European Institute for Science, Media, and Democracy (Atomium) in Bruxelles (2019). Ugo is professor at the Joint International Doctoral (PhD) degree program in Law, Science and Technology, an interdisciplinary integrated doctorate of the EU's Erasmus Mundus EMJDs programs. Author of eleven monographs and numerous essays in scholarly journals and book chapters, his main interests are Artificial Intelligence & law, network and legal theory, governance, and information technology law (specially data protection law and copyright).

Fabio Bellifemine's Legacy

"Aula Magna" room

October 31st, 2019 | 11:30-12:30

On October 31st, PRIMA 2019 will host an event in memory of Fabio Bellifemine, who graduated in Information Sciences in Torino and died prematurely a year ago.

Fabio is internationally known for his research activity in the field of multi-agent systems and in particular for the contribution to the JADE project and for his role in the FIPA Architecture Board. More recently, he actively worked in the IoT field.

The event is open to students and teachers of the Computer Science Department of the University of Torino.

The following speakers will be present:

- Federico Bergenti (Session Chair)
- Liliana Ardissono
- Albert Werbrouck
- Leonardo Chiariglione
- Giovanni Caire
- Danilo Gotta
- Laura Contin
- Giovanni Rimassa
- Monique Calisti
- Giancarlo Fortino

Social Events

Bring with you the tickets distributed at the registration desk!

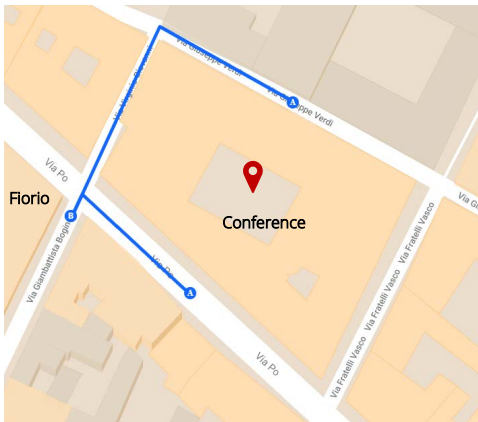
Welcome Reception

October 28th, 2019 | 18:30-21:00

The welcome reception will be held at the historic caffè Caffè Fiorio, next to the conference location.

Founded in 1780, Fiorio soon became a fashionable meeting place for the artistic, intellectual and political classes of the capital of the Kingdom of Sardinia. It became known as "the café of the Machiavellis and of the pigtails."

Caffè Fiorio
Via Po, 8/C
10124 Torino TO



From conference to Caffè Fiorio (3 mins walking)

Social Dinner

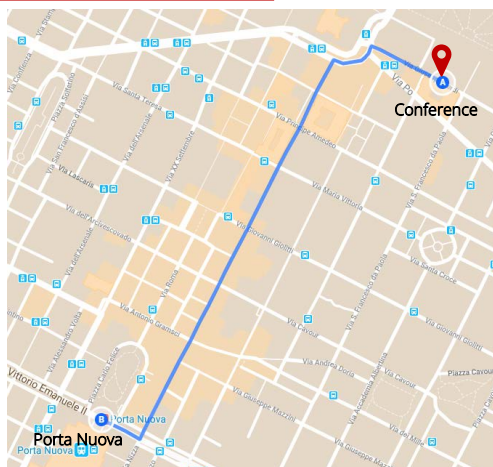
October 30th, 2019 | 20:00-22:30

The social dinner will be held at the Eataly Torino Lingotto restaurant.

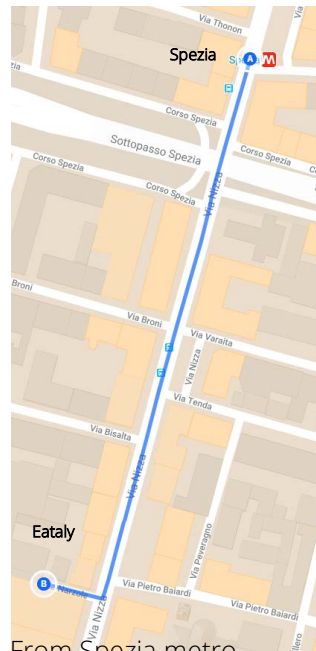
Eataly is a chain of retail stores specialized in the sale and distribution of Italian quality food products. The first store, where the social dinner will be located, was opened in 2007 in Torino, north of the Lingotto complex, in the Nizza Millefonti district. The space was born from the renovation of the old Carpano factory.

Eataly is 5 minutes walking from the Spezia metro station. From the conference location, the closest place where to take the metro is the Porta Nuova railway station, which is 15 minutes walking distance or can be reached by taking bus 68.

Eataly Torino Lingotto
Sala dei Duecento
Via Nizza 230/14
10126 Torino TO



From conference to Porta Nuova
metro station (15 mins walking)

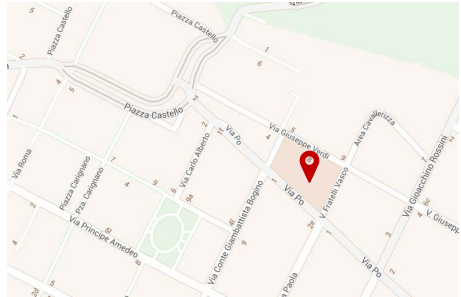


From Spezia metro
station to Eataly Torino
Lingotto (5 mins walking)

Conference Location

PRIMA 2019 will be hosted by the University of Torino in the historical Rectory building.

Palazzo del Rettorato
Università degli Studi di Torino
Via Verdi, 8
10124 Torino TO



Wi-Fi

Wireless internet is available to conference participants in the conference location.

The University of Torino is part of the Eduroam network whose hotspots are available at the conference location.

If you have no access to Eduroam, you can ask for personal credentials, to be used for the duration of the conference, at the registration desk.

Website

<https://prima2019.di.unito.it/>



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Where to eat

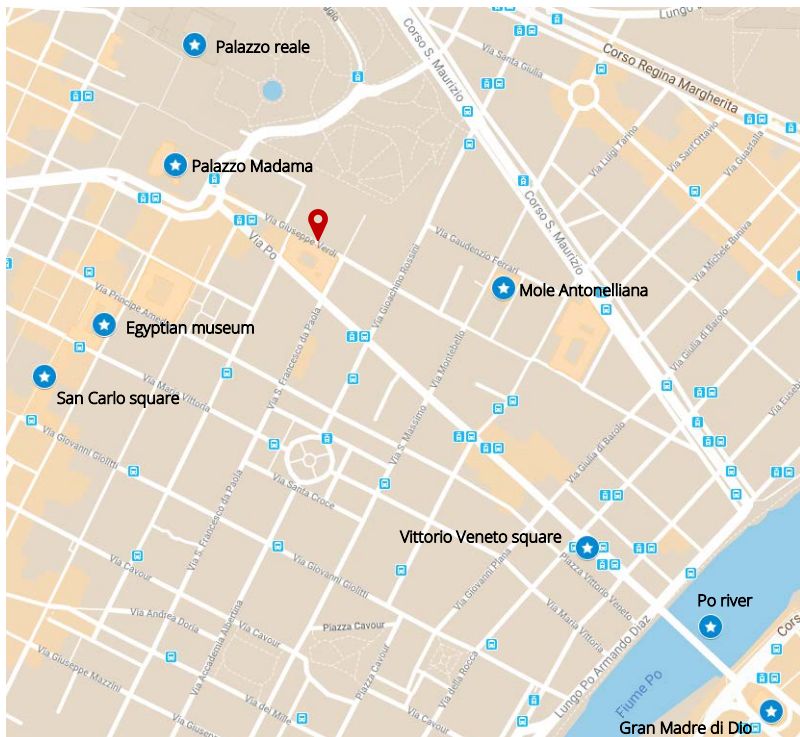
For lunch we recommend, among the others, the following cafès and restaurants close to the conference location (5 mins walking distance):

- Caffè Regio (Cafè, sandwiches and warm dishes)
- Caffè Roberto (Cafè, sandwiches and warm dishes)
- Caffè Fiorio (Cafè and restaurant)
- Caffè Bar Università (Cafè and sandwiches)
- Focacceria Terre Liguri (Focaccia flat bread)
- Focacceria Gran Torino – Reale (Focaccia flat bread)
- Pizzeria La Caravella (Pizza)
- Pizzeria Alla Mole (Pizza)
- Dual Ristorante Pizzeria (Pizza and restaurant)
- Le Vitel Etonné (Traditional restaurant)



The city of Torino hosts several monuments and museums, thanks to its central role in the Italian history. In particular, we recommend not to miss the following sites, close to the conference location:

- Palazzo Reale (Royal palace of House Savoy)
- Palazzo Madama
- Mole Antonelliana (Cinema Museum)
- Egyptian Museum
- San Carlo square
- Vittorio Veneto square
- Gran Madre di Dio church
- Po river



The City of Torino¹

Torino (Turin) is a city and an important business and cultural center in northern Italy. It is the capital city the Piedmont region and was the first capital city of Italy from 1861 to 1865. The city is located mainly on the western bank of the Po River and it is surrounded by the western Alpine arch and by the Superga Hill.

The city has a rich culture and history, being known for its numerous art galleries, restaurants, churches, palaces, squares, parks, gardens, theatres, libraries, museums and other venues. Torino is well known for its Renaissance, Baroque, Rococo, Neo-classical, and Art Nouveau architecture. Many of Torino's public squares, castles, gardens and elegant palaces such as the Palazzo Madama, were built between the 16th and 18th centuries. A part of the historical center of the city was inscribed in the World Heritage List under the name Residences of the Royal House of Savoy.

The city used to be a major European political center. From 1563, it was the capital of the Duchy of Savoy, then of the Kingdom of Sardinia ruled by the Royal House of Savoy, and the first capital of the unified Italy (the Kingdom of Italy) from 1861 to 1865. Torino is sometimes called "the cradle of Italian liberty" for having been the birthplace and home of notable individuals who contributed to the Risorgimento, such as Camillo Cavour, a leading figure in the movement towards Italian unification.

Torino hosts prestigious museums and monuments, including the Egyptian Museum (the oldest museum entirely dedicated to Ancient Egypt and the second largest after Cairo's one) and the Mole Antonelliana (featured on the Italian two cent euro coins), which hosts the National Museum of Cinema. The several monuments and sights make Torino one of the world's top 250 tourist destinations. Torino is also well known as the home of the Shroud of Turin, the football teams Juventus F.C. and Torino F.C., the headquarters of automobile manufacturers FIAT, Lancia and Alfa Romeo, and as host of the 2006 Winter Olympics. Several International Space Station modules, such as Harmony, Tranquility, and Columbus, were also manufactured at the Thales Alenia Space factory in Torino.

¹ Source: <https://en.wikipedia.org/wiki/Turin>