# Laura Arditti

PHD STUDENT · POLITECNICO DI TORINO

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## Education.

### **Moxoff Academy**

MOXOFF: MATHEMATICS FOR INNOVATION

- https://www.moxoff.com/academy/
- Participation to the academy with a full scholarship obtained on a competitive basis.
- The Moxoff Academy is a technical-scientific specialization program on applied mathematics and data science that allows to acquire knowledge to tackle innovation projects in the industrial field.

#### **PhD in Pure and Applied Mathematics**

POLITECNICO DI TORINO

- Doctoral scholarship fully founded by the Excellence Project of the Department of Mathematical Sciences (DISMA) in Politecnico di Torino, which has been designated as a department of excellence based on a competitive selection process carried out by the Italian Ministry of Education, University and Research (MIUR).
- Advisor: Prof. Giacomo Como
- Research Project: Structural properties of network games and resilient control of network systems.

#### Master in Mathematical Engineering

POLITECNICO DI TORINO

- Final grade: 110/110 cum laude
- Thesis: Analysis on Weighted Homogeneous Trees
- Advisor: Prof. Maria Vallarino

#### **Bachelor in Physical Engineering**

POLITECNICO DI TORINO

• Final grade: 110/110 cum laude

#### High School Degree (Maturità Scientifica - Programma Brocca)

LICEO SCIENTIFICO FRANCESCO CECIONI

#### • Final grade: 100/100 cum laude

## Research Interests\_

- My research efforts are concentrated on game theory and its relationship with graphical models, such as Markov random fields. These are
  important tools in statistical sciences, and more recently in machine learning, and their newly established connections with network games
  could produce new insight and move forward the study of both fields, with many possible applications to social and economic networks. In
  parallel to this, I am working within the MIUR Excellence Project 2018 2022. In particular, I am focusing on the development of mathematical
  models and tools for the analysis of systemic risk and the resilient control synthesis of network systems. The main application domains are
  social networks, infrastructure networks (such as transport and energy) and economic and financial networks.
- Keywords: network games, graphical models, game dynamics, dynamics over networks, control theory, network resilience.

### Publications\_

FEBRUARY 10, 2021

Milan, Italy Oct. 6, 2020 - Nov. 23, 2020

### Torino, Italy

Oct. 2018 - Present

*Torino, Italy* Sept. 2016 - Sept. 2018

Torino, Italy Sept. 2013 - Sept. 2016

> Livorno, Italy 2008 - 2013

<ul> <li>Arditti L., Como G., Fagnani F. Separable games. In preparation. Preprint available at arXiv:2003.13128 (https://arxiv.org/abs/2003.13128)</li> <li>Arditti L., Como G., Fagnani F. Graphical Games and Decomposition. Presented at the 21rst IFAC World Congress (Berlin, Germany, 12-17 July 2020). Accepted for publication in IFAC-PapersOnLine. Available at arXiv:2003.13123 (https://arxiv.org/abs/2003.13123)</li> <li>Vanelli M., Arditti L., Como G., Fagnani F. On games with coordinating and anti-coordinating agents. Presented at the 21rst IFAC World Congress (Berlin, Germany, 12-17 July 2020). Accepted for publication in IFAC-PapersOnLine. Available at arXiv:1912.02000 (https://arxiv.org/abs/1912.02000)</li> <li>Arditti L., Tabacco A., Vallarino M. (2020) BMO Spaces on Weighted Homogeneous Trees. In: The Journal of Geometric Analysis. DOI: https://doi.org/10.1007/s12220-020-00435-w Also available at arXiv:2006.02693 (https://arxiv.org/abs/2006.02693)</li> <li>Arditti L., Tabacco A., Vallarino M. (2020) Hardy Spaces on Weighted Homogeneous Trees. In: Boggiatto P. et al. (eds) Advances in Microlocal and Time-Frequency Analysis. Applied and Numerical DOI: https://doi.org/10.1007/978-3-030-36138-9_2 Also available at arXiv:1902.09273 (https://arxiv.org/abs/1902.09273)</li> </ul>	Harmonic Analysis. Birkhäuser, Cham
Scientific Activity	
From Shortest Paths to Reinforcement Learning: A MATLAB-Based Tutorial on Dynamic	Springer International Publishing
Programming	
EURO ADVANCED IUTORIALS ON OPERATIONAL RESEARCH	December 21, 2020
<ul> <li>https://www.springer.com/gp/book/9783030618667</li> <li>Poorf reader of the manuscript.</li> </ul>	
The 9th International Conference on Complex Networks and their Applications	Madrid, Spain
COMPLEX NETWORKS 2020	December 1-3, 2020
<ul> <li>https://complexnetworks.org/</li> <li>Member of the Technical Program Committee (https://complexnetworks.org/committees/).</li> </ul>	
21rst IFAC World Congress	Berlin, Germany
International Federation of Automatic Control	July 11-17, 2020
<ul><li>https://www.ifac2020.org/</li></ul>	
Presenter and author of two contributions, appearing in the invited session "Distributed Control and Op	timization On Complex Networks".
Seminar at LIDS - MIT	MIT, Cambridge
LABORATORY FOR INFORMATION & DECISION SYSTEMS	May 20, 2020
Speaker for the seminar held via Zoom on "Separable Games".	
• https://lids.mit.edu/news-and-events/events/zoom-separable-games	
Poster Session for the Visit of the Advisory Board of the DISMA Excellence Project	Politecnico di Torino
DEPARTMENT OF MATHEMATICAL SCIENCES	February 18, 2020
<ul> <li>Separability and Stability of Games</li> <li>https://areeweb.polito.it/disma-excellence/allegati/2020/giornata_AB.pdf</li> </ul>	
DISMA Excellence Seminar	Politecnico di Torino
Department of Mathematical Sciences	December 3, 2019
<ul> <li>Graphicality and decomposition of games</li> <li>https://areeweb.polito.it/disma-excellence/allegati/2019/Visiting/seminario_Ard</li> </ul>	itti.pdf
DISMA PhD Poster Session	Politecnico di Torino
Department of Mathematical Sciences	November 22, 2019
Graphicality and decomposition of games	
• http://www.disma.polito.it/en/news/(idnews)/14046	
Network Dynamics in the Social, Economic, and Financial Sciences	Torino, Italy
Department of Mathematical Sciences, Politecnico di Torino	November 4-8, 2019
<ul> <li>https://areeweb.polito.it/disma-excellence/NDR/Dynamics.html</li> <li>Participation as member of the organising group of the workshop.</li> </ul>	

 Speaker presenting "On graphicality and decomposition of games" (slides available at https://areeweb.polito.it/disma-excellence/ NDR/allegati/slide/Short\_presentations\_2/Arditti.pdf).

<ul> <li>https://areeweb.polito.it/disma-excellence/NDR/Resilient.html</li> <li>Participation as member of the organising group of the workshop.</li> <li>Speaker in the short presentation session</li> </ul>	
National Meeting on Harmonic Analysis	Bergamo, Italv
	May 27-29, 2019
<ul> <li>https://sites.google.com/view/aabergamo2019/home</li> <li>Speaker presenting "Hardy spaces on weighted homogeneous trees</li> </ul>	
Schools, Conferences and Workshops	
Graphs and Randomness in Turin	Torino, Italy
Mathematics Department, Università di Torino	January 20-21, 2020
<ul> <li>https://sites.google.com/view/graphs-and-randomness-in-turin</li> <li>Participation to the workshop.</li> </ul>	
The Oxford Summer School in Economic Networks	Oxford, United Kingdom
Mathematical Institute, University of Oxford	June 24-28, 2019
<ul> <li>https://www.inet.ox.ac.uk/events/the-oxford-summer-school-in-economic-networks-1/</li> <li>Participant to the summer school with partial funding through a scholarship obtained on a competitive basis.</li> </ul>	
New Trends in Harmonic Analysis	Torino, Italy
Department of Mathematical Sciences, Politecnico di Torino	May 24-25, 2018
<ul> <li>http://calvino.polito.it/~anfunz/workshop2018_2/ntha.htm</li> <li>Participation to the workshop.</li> </ul>	
Weekly Seminars	Torino, Italy
Politecnico di Torino, DISMA Department of Excellence	Oct 2018 - Present
<ul> <li>https://areeweb.polito.it/disma-excellence/pastEvents.html</li> <li>Weekley attendance and participation as a speaker on December 3, 2019 presenting "Graphicality and decomp</li> </ul>	osition of games".
Young Researchers Workshop in Harmonic Analysis	Torino, Italy
Department of Mathematical Sciences, Politecnico di Torino	April 13, 2018
<ul> <li>http://calvino.polito.it/~anfunz/workshop2018_1/yrwha.htm</li> <li>Participation to the workshop.</li> </ul>	
MATLAB Master Class: "Programming with MATLAB"	Torino, Italy
Politecnico di Torino	October 22, 2014
Participation to the workshop.	
Algebraic Geometry and Related Topics XII	Torino, Italy
<ul> <li>http://ricerca.mat.uniroma3.it/users/lopez/GGAACXII/GGA2014.html</li> <li>Participation to the workshop.</li> </ul>	June 4-1, 2014
PhD Courses	
Targeting in social networks	Torino. Italv
Politecnico di Torino, DISMA Department of Excellence	October 16-17, 2019

- https://areeweb.polito.it/disma-excellence/NDR/Courses.html
- PhD course held by Prof. Agnieszka Rusinowska, from Centre d'Economie de la Sorbonne.

#### Modelling and distributed control of the power grid

POLITECNICO DI TORINO, DISMA DEPARTMENT OF EXCELLENCE

**Resilient Control of Infrastructure Networks** 

DEPARTMENT OF MATHEMATICAL SCIENCES, POLITECNICO DI TORINO

- https://areeweb.polito.it/disma-excellence/NDR/Courses.html
- PhD course held by Prof. Sandro Zampieri, from the University of Padova.

#### Network systems in science and technology

POLITECNICO DI TORINO, DISMA DEPARTMENT OF EXCELLENCE

- https://areeweb.polito.it/disma-excellence/NDR/Courses.html
- PhD course held by Prof. Francesco Bullo, from the University of California Santa Barbara.

Torino, Italy

Torino, Italy

November 11-12, 2019

September 16-20, 2019

Torino, Italy

September 24-27, 2019

### Stochastic optimization and optimal learning

POLITECNICO DI TORINO, DISMA DEPARTMENT OF EXCELLENCE

- https://didattica.polito.it/pls/portal30/gap.pkg\_guide.viewGap?p\_cod\_ins=01TBCRT&p\_a\_acc=2019&p\_header=S&p\_ lang=IT
- PhD course held by Prof. Paolo Brandimarte, from Politecnico di Torino.

#### Integrable discretization

POLITECNICO DI TORINO, DISMA DEPARTMENT OF EXCELLENCE

- https://areeweb.polito.it/disma-excellence/DDG/phdCourse.html
- PhD course held by Prof. Udo Hertrich-Jeromin, from Vienna University of Technology.
- · Passed with merit

#### Data Science for Networks (Excellence Training)

Politecnico di Torino, SmartData Center

- https://smartdata.polito.it/phd-course-data-science-for-networks/
- PhD course held by Prof. Fabricio Murai Ferreira and Prof. Flavio Figueiredo.

### Work Experience

#### Politecnico di Torino

TEACHING ASSISTANT FOR THE COURSE "NETWORK DYNAMICS AND LEARNING"

- Course Level: graduate level course within the master program in Data Science And Engineering.
- Included modules: graph theory, Markov probabilistic models, game theory, distributed optimization, inference algorithms, opinion dynamics, epidemics models, learning in games.
- Teachers: Prof. Fabio Fagnani.
- Employment kind: term-contract employment
- Activities and responsibilities:
- 20 hours of teaching (1,5 hours of classroom time per week)
- Preparation of Python notebooks, exercise sheets and discussion during weekly lab sessions
- Assisting students in dedicated consulting hours
- · Correction of project works done by students
- · Assistance during written and oral examinations

#### Politecnico di Torino

TEACHING ASSISTANT FOR THE COURSE "DYNAMICS OVER NETWORKS"

- Course Level: graduate level course within the master program in Mathematical Engineering and Physics of Complex Systems.
- Included modules: graph theory, game theory, deterministic and stochastic dynamical systems over networks.
- Teachers: Prof. Fabio Fagnani.
- · Employment kind: term-contract employment Activities and responsibilities:
- 10 hours of teaching (1,5 hours of classroom time per week)
- Preparation of exercise sheets and discussion during weekly exercise sessions
- Assisting students in dedicated consulting hours
- · Correction of project works done by students
- · Assistance during written and oral examinations

#### Politecnico di Torino

TEACHING ASSISTANT FOR THE COURSE "MATHEMATICAL METHODS"

- Course Level: undergraduate level course within the bachelor program in Electronic and Communications Engineering, Physics Engineering, Computer Engineering.
- Included modules: complex analysis and theory of distributions.
- Teachers: Prof. Giacomo Como.
- · Employment kind: term-contract employment

#### Activities and responsibilities:

- 20 hours of teaching (1,5 hours of classroom time per week)
- Preparation of exercise sheets and discussion during weekly exercise sessions
- Assisting students in dedicated consulting hours
- · Assistance during written and oral examinations

Jan. 2020 - Sept. 2020

Torino, Italy

Feb 11 - Mar 01 2019

Jan 15 - Feb 05 2019

Torino, Italy

#### Torino, Italy Sept. 2020- Feb.2021

#### Torino, Italy July, 2019

Torino, Italy

### Sept. 2020- Feb.2021

### Torino, Italy

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#### Politecnico di Torino

TEACHING ASSISTANT FOR THE COURSE "DYNAMICS OVER NETWORKS"

- Course Level: graduate level course within the master program in Mathematical Engineering and Physics of Complex Systems.
- Included modules: graph theory, game theory, deterministic and stochastic dynamical systems over networks.
- Teachers: Prof. Giacomo Como.
- Employment kind: term-contract employment

#### Activities and responsibilities:

- 20 hours of teaching (1,5 hours of classroom time per week)
- Preparation of exercise sheets and discussion during weekly exercise sessions
- · Assisting students in dedicated consulting hours
- Correction of project works done by students
- · Assistance during written and oral examinations

#### Politecnico di Torino

TUTOR FOR THE COURSE "MATHEMATHICAL METHODS FOR ENGINEERING"

- · Included modules: complex analysis and distribution theory, probability theory
- Teachers: Prof. Andrea Tosin, Prof. Paola Siri
- Employment kind: Part time collaboration

#### Activities and responsibilities:

- 20 hours of tutoring (1,5 hours of classroom time per week)
- Assist students in dedicated consulting hours
- Correct exercises done by the students
- Give assistance during written examinations

### **Competences and Abilities**

#### **Technical skills**

- Programming Languages:
  - Java ★★☆,
  - Python  $\star \star \Leftrightarrow$ ,
  - SQL ★★☆,
  - Cypher Query Language  $\star \star \Leftrightarrow$ ,
  - HTML  $\bigstar \Leftrightarrow \Leftrightarrow$ ,
  - CSS ★☆☆,
  - Javascript ★☆☆,
  - LaTeX ★★☆
  - Matlab ★☆☆
- Applications/programs: Visual Studio, Github, Jupyter Notebooks, IntelliJ IDEA
- Databases: Oracle Database, Neo4j

#### Languages

- Italian: mother tongue
- English: IELTS 6.5 competent user
- French: DELF A2

#### Sept. 2019- Sept.2020