

# Sara Marziali

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## Curriculum Vitae

January 15, 2026

### Personal data

Birth Date: March 30, 1996

Gender: F

Nationality: Italian

Scopus ID: 57415052400

ORCID ID: 0009-0000-4525-423X

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### Academic appointments

#### Current position

- November 1, 2022 – **PhD Student in Engineering and Information Science in Engineering and Science**, *University of Siena*, Siena, Italy.  
– Current

### Education

- October 1, 2019 – April 22, 2022 **Master Degree in Applied Mathematics**, *University of Siena*, Italy, 110/110 cum laude.  
Thesis: “*Combinatorial and Discrete Differential Operators for the Study of Beta-sheets*”, Advisor: Cristiano Bocci.
- October 1, 2015 – April 12, 2019 **Bachelor Degree in Mathematics**, *University of Siena*, Italy, 110/110 cum laude.  
Thesis: “*Operatori Logici e Reti Neurali*”, Advisor: Luca Chiantini.
- September 2010 – July 2015 **Upper secondary school diploma**, *Liceo Scientifico “Galileo Galilei” of Siena*, Italy, 100/100 cum laude.

### Awards, Grants and Fellowships

- November 1, 2022 – Current **Ph.D. Full Scholarship in Engineering and Information Science in Engineering and Science (XXXVIII cycle)**, *University of Siena*, Siena, Italy.
- July 7 – 11, 2025 **Travel award for the 2025 SIAM Conference on Applied Algebraic Geometry (AG25)**, *University of Wisconsin-Madison*, Madison, Wisconsin USA.
- November 23, 2022 **Best student in Applied Mathematics at DIISM in a.y. 2020-2021 Awarding**, *University of Siena*, Siena, Italy.

### Research interests

Applied Algebraic Geometry, Tensors and Applications, Topological Data Analysis for Machine Learning, and Bioinformatics.

## Publications

1. B. T. Corradini, B. Cullen, C. Gallegati, G. A. D’Inverno, S. Marzali, M. Bianchini, F. Scarselli, *Training dynamics of GANs through the lens of persistent homology*, Neurocomputing **661**, 131976 (2026), doi: 10.1016/j.neucom.2025.131976.
2. S. Marzali, *Boolean operators and neural networks*, Annali dell’Università di Ferrara (2024), doi: 10.1007/s11565-024-00541-5.
3. M. Tanfoni, E. G. Cerone, S. Marzali, N. Pancino, M. Maggini, M. Bianchini, *Generated or Not Generated (GNG): The Importance of Background in the Detection of Fake Images*, Electronics **13**, no. 16, 3161 (2024), doi: 10.3390/electronics13163161.
4. S. Marzali, G. Nunziati, A. L. Prete, N. Niccolai, M. Bianchini, *SADIC v2: A modern implementation of the Simple Atom Depth Index Calculator*, SoftwareX **27** (2024), doi: 10.1016/j.softx.2024.101803.
5. S. Marzali, G. Nunziati, A. L. Prete, N. Niccolai, S. Brunetti, M. Bianchini, *A Discrete Geometry Method for Atom Depth Computation in Complex Molecular Systems*, International Conference on Discrete Geometry and Mathematical Morphology (2024), 443 – 455, doi: 10.1007/978-3-031-57793-2\_34.
6. F. Guerranti, M. Mannino, F. Baccini, P. Bongini, N. Pancino, A. Visibelli, S. Marzali, *CaregiverMatcher: graph neural networks for connecting caregivers of rare disease patients*, Procedia Computer Science **192** (2021), 1696 – 1704, doi: 10.1016/j.procs.2021.08.174.

## Teaching experience

### Bachelor and master level

- May 12 – 23, 2025 **Teaching for the “Ciclo seminariale di matematica in lingua inglese - Centro CLUSS - UniStraSi**, University for Foreigners of Siena (UniStraSi), Siena, Italy, 12 hours.
- October 1, 2022 – **Teaching Assistant for the Mathematical Analysis 2 undergraduate course (Spring 2023)**, Department of Information Engineering and Mathematics, University of Siena, Siena, Italy.
- October 1, 2022 – **Teaching Assistant for the Linear Algebra undergraduate course (Fall 2022, Spring 2023)**, Department of Information Engineering and Mathematics, University of Siena, Siena, Italy.
- October 1, 2022 – **Teaching Assistant for the Mathematical Analysis 1 undergraduate course (Fall 2022)**, Department of Information Engineering and Mathematics, University of Siena, Siena, Italy.

## Secondary school level

December 21, 2023 – April 6, 2024 **Teacher of Mathematics, Logic and Physics for the “Corso di preparazione ai test di ammissione e chirurgia a.a. 2023/2024”, Department of Medicine, Surgery and Neuroscience, University of Siena, Siena, Italy.**

## Research Stays

October 17, 2024 – April 30, 2025 **Visiting scholar, Université Toulouse III - Paul Sabatier, Toulouse, France**  
Host: Prof. Fulvio Gesmundo.

January 12 – April 4, 2024 **Visiting scholar, Auburn University, Auburn, Alabama, USA**  
Host: Prof. Luke Oeding.

## Conferences, workshops and seminars

### Invited talks

October 23, 2025 **Seminar “Product of tensors and description of the network for matrix multiplication via Strassen’s algorithm”, within “TensorDec group Seminars”, University of Trento, Trento, Italy.**

May 29, 2024 **Seminar “Product of Tensors and Description of Networks”, within ‘TensorDec group Seminars’, University of Trento, Trento, Italy.**

March 19, 20, 21, 2024 **Seminar “Product of Tensors and Description of Networks”, Johns Hopkins University, Baltimore, Maryland, USA.**

January 30, 2024 **Seminar “Product of Tensors and Description of Networks”, within “Auburn Algebra Seminar”, University of Auburn, Auburn, Alabama, USA.**

November 17, 2023 **Seminar “Product of Tensors and Description of Networks”, within “Applied Algebraic Geometry 2023-2024 Seminars”, University of Florence, Florence, Italy.**

### Conference and workshop presentations

October 3, 2025 **WORKSHOP ARCIDOSSO25: Aspetti matematici e fondazionali della modellizzazione di sistemi complessi, Contribution title: “Product of Tensors and Description of Networks”, Castello Aldobrandesco, Arcidosso (Grosseto), Italy**  
October 3 – 5, 2025.

8 July, 2024 **SIAM CONFERENCE ON APPLIED ALGEBRAIC GEOMETRY (AG25), Contribution title: “The Batthacharya-Mesner Product: From Tensor Rank Analysis to Description of Networks”, University of Wisconsin-Madison, Madison, USA**  
July 7-11, 2025.

May 14, 2024 **JM Invariant at 60 - A Conference on Tensor Invariants in Geometry and Complexity Theory, Contribution title: “Product of Tensors and Description of Networks”, Auburn University, Auburn, Alabama, USA**  
May 13–17, 2024.

April 18, 2024 **IAPR Third International Conference on Discrete Geometry and Mathematical Morphology**, *Contribution title: "A Discrete Geometry Method for Atom Depth Computation in Complex Molecular Systems"*, University of Florence, Florence, Italy  
April 15–18, 2024.

#### [Conference and workshop attendance](#)

July 29 – August 2, 2024 **Effective Methods in Algebraic Geometry – MEGA 2024**, MPI für Mathematik in den Naturwissenschaften Leipzig and Universität Leipzig, Leipzig, Germany.

June 13, 14, 2024 **II Meeting UMI for Doctoral Students**, Naples, Italy.

September 18 – 22, 2023 **Third Young Applied Mathematicians Conference**, *University of Siena, Siena, Italy.*

January 24, 25, 2023 **Workshop on Communicating Mathematics for the Public**, Isaac Newton Institute, Cambridge, UK.

#### [Organiser](#)

September 22 – 26, 2025 **Organising and Scientific Committee for “The Fifth Young Applied Mathematicians Conference”**, *University of Padua, Padua, Italy*, with G. Auricchio, E. Bachini, C. Carrara, G. A. D’Inverno, C. Faccio, A. Kushova, A. Marchetti, C. Millevoi, E. Onofri.

December 4 – 6, 2024 **Organising Committee for the “Learning on Graph Conference 2024 – Italy Meetup”**, *University of Siena, Siena, Italy*, with P. Bongini, F. Costanti, B. Cullen, G. A. D’Inverno, C. Gallegati, C. Graziani, V. Lachi, N. Pancino, F. Pichi.

September 16 – 20, 2024 **Organising and Scientific Committee for the “Fourth Young Applied Mathematicians Conference”**, *University of Rome “La Sapienza”, Rome, Italy*, with G. Auricchio, C. Carrara, G. A. D’Inverno, C. Graziani, A. Kushova, G. Loli, A. Marchetti, M. Menci, E. Onofri.

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## [Educational activities](#)

October 13 – 24, 2025 **Masterclass and PhD course - Tensors and their applications: foundations and recent advances**, *University of Trento*, Lecturer: Jeroen Zuiddam (U. Amsterdam / QuSoft), Exercise sessions: Maxim van den Berg (Ruhr-U. Bochum / U. Amsterdam), Trento, Italy.

May 26 – 30, 2025 **TiME 2025 – Invariant Theory from Classic to Modern Developments**, *Lie-Størmer Center, Tromsø, Norway*.

June 10 – 14, 2023 **6th Advanced Course on Data Science & Machine Learning (ACDL)**, *Castiglione della Pescaia (Grosseto), Italy*.

July 22 – August 16, 2019 **Interuniversity Mathematics Summer School (SMI)**, *Course of Numerical Analysis with Professor Michele Benzi (Scuola Normale Superiore, Pisa, Italy): final grade A; Course of Differential Geometry with Prof. Liviu Ornea (University of Bucharest, Romania): final grade B*, Perugia, Italy.

## Further information

### Scientific Associations and Membership

- *Society for Industrial and Applied Mathematics (SIAM)*, Student Membership (July 1, 2025 – December 31, 2026).

### Professional activities and projects

May 9, 2022 – **Pint of Science, Local Team Collaborator**, Siena, Italy.  
Current

October 5, 19, 2023 **7th Rare Disease Hackathon 2020: Health System Forum - Re-evolution of Intelligence Special Lysosomal Storage Diseases, Challenge: "Caregiving pathways. Patients, caregivers and lysosomal storage disorders: challenges and solutions"**, Proposed solution: "SAM: Assistance and Monitoring System", "Stazione La Leopolda", Florence, Italy  
Third place awarded.

November 4, 5, 2020 **Rare Disease Hackathon 2020 (digital edition)**, "Stazione La Leopolda", Firenze, Italy  
Finalist Team.

### Computer skills and competencies

- Matlab, Python, Latex
- European Computer Driving Licence (ECDL Certificate) achieved on June 3, 2014.

### Language competences

- Italian: Mother tongue
- English: Proficient, Cambridge C1 Advanced exam in English (CAE), Certification from Cambridge University, English Qualifications, June 2024.

## References

### Prof. Dr. Luca Chiantini

Department of Information Engineering and Mathematics, University of Siena  
✉ luca.chiantini@unisi.it

### Prof. Dr. Cristiano Bocci

Department of Information Engineering and Mathematics, University of Siena  
✉ cristiano.bocci@unisi.it

### Prof. Dr. Alessandra Bernardi

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