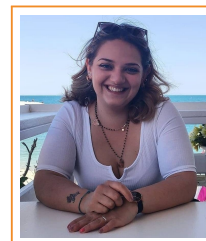


Sara Sottile

Curriculum Vitae

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📄 sarasottile.github.io/
in [sarasottile](#)



Research Interests

Mathematical modeling and analysis in epidemiology and biology, with a focus on dynamical systems, multiple time scale dynamics, and Geometric Singular Perturbation Theory (GSPT). Expertise in Health Technology Assessment (HTA) for vaccines, cost-effectiveness analyses of healthcare interventions and conceptualizing and implementing simulation models; statistical analysis and forecasting in COVID-19 and cancer epidemiology. Passionate about applying mathematical and statistical tools to health-related challenges, combining precision and interdisciplinary approaches.

Academic Positions

- Mar 2024-Present **Research Fellow**, *University of Bologna*, Department of Medical and Surgical Sciences.
Research project: "Data management and analysis for WP5 of Orchestra project"
Supervisor: Prof. Paolo Boffetta.
- Feb 2023-Mar 2024 **Research Fellow**, *University of Trento*, Department of Mathematics.
Research project: "Analysis of epidemic models"
Supervisor: Prof. Andrea Pugliese.

Other Research Experience

- Apr 2024-Present **Research Collaboration**, *European Network on Optimising Treatment with Therapeutic Antibodies in chronic inflammatory diseases (ENOTTA)*.
Collaboration within the project "A mechanistic mathematical model to describe the effect of methotrexate in reducing immunogenicity of adalimumab in axial spondyloarthritis".
- Oct-Nov 2024 **Research Collaboration**, *VIHTALI-Value in Health Technology and Academy for Leadership and Innovation*.
Collaboration within the project "Health Technology Assessment of the adjuvanted quadrivalent influenza vaccine Flud Tetra: update".
- Jan-Jul 2022 **Research Collaboration**, *Evidera*.
Collaboration within the project "Preparation of HTA for new influenza vaccine in Spain".
- Apr-Sep 2021 **Research Collaboration**, *VIHTALI-Value in Health Technology and Academy for Leadership and Innovation*.
Collaboration within the project "Economic evaluation of the introduction of the live attenuated influenza vaccine (Fluenz Tetra®) in the Italian pediatric population (2-6 years)".

Education

- Nov 2019-Jan 2023 **Ph.D. in Mathematics**, *University of Trento*, Trento, Italy.
Research project: "mathematical models for epidemics".
Thesis: "Different approaches to epidemic modelling: from theoretical analysis to real data", Supervisor: Prof. Andrea Pugliese
- Oct 2017-Jul 2019 **M.Sc. in Mathematics (Modelling Curriculum)**, *University of Turin*, Turin, Italy.
Thesis: "Epidemic Models: a Switch Control for Networks", Supervisor: Prof. Lorenzo Fatibene, Co-supervisor: Prof. Xinzhi Liu, Grade: 110/110 summa cum Laude
- Jan 2019-Apr 2019 **Exchange program**, *University of Waterloo*, Waterloo, Ontario, Canada.
- Sep 2014-Oct 2017 **B.Sc. in Mathematics**, *University of Bari "A. Moro"*, Bari, Italy.
Thesis: "On the constitutive equations in Thermodynamics", Supervisor: Prof. Arcangelo Labianca, Grade: 107/110

Experience in Educational Contributions

- Mar 2024-Present **Author Collaboration**, *Zanichelli editore S.p.A.*
Preparation of exercises for the book *Matematica.blu 2.0*
- Dec 2022-Present **Author and Reviewer**, *"Qui si Risolve"*.
Preparation of educational material for High School and University.

Teaching

- 1st semester
A.Y. 2023-24 **Teaching Assistant for the course "Geometry I"**, *BSc in Physics*, University of Trento.
- 1st semester
A.Y. 2023-24 **Teaching Assistant for the course "Calculus I"**, *BSc in Computer Science and BSc in Computer, Communication and Electronic Engineering, Department of Information Engineering and Computer Science*, University of Trento.
Taught in English.
- Sept 2023 **Teaching Assistant for the Mathematics pre-course**, *Department of Economics and Management*, University of Trento.
Taught in English.
- 2nd semester
A.Y. 2022-23 **Teaching Assistant for the course "Calculus II"**, *BSc in Computer Science and BSc in Computer, Communication and Electronic Engineering, Department of Information Engineering and Computer Science*, University of Trento.
Taught in English.
- 1st semester
A.Y. 2022-23 **Teaching Assistant for the course "Calculus I"**, *BSc in Computer Science and BSc in Computer, Communication and Electronic Engineering, Department of Information Engineering and Computer Science*, University of Trento.
Taught in English.
- 1st semester
A.Y. 2022-23 **Teaching Assistant for the course "Mathematical Analysis III"**, *BSc in Physics, Department of Physics*, Trento, Italy.
- 1st semester
A.Y. 2022-23 **Teaching Assistant for the course "Mathematical Modeling and Simulation"**, *MSc in Quantitative and Computational Biology*, University of Trento.
Taught in English.
- Jan 2021-Mar 2022 **Exam Supervision**, *Department of Economics and Management*, Trento, Italy.
- 1st semester
A.Y. 2021-22 **Teaching Assistant for the course "Calculus I"**, *BSc in Computer Science and BSc in Computer, Communication and Electronic Engineering, Department of Information Engineering and Computer Science*, University of Trento.
Taught in English.
- 1st semester
A.Y. 2020-21 **Teaching Assistant for the course "Mathematical Modeling/Mathematical Biology"**, *MSc in Quantitative and Computational Biology and MSc in Mathematics*, University of Trento.
Taught in English.

Mentoring

- Michela D'Amario *Parameters estimations for modelling the COVID-19 pandemic in Italy*, MSc Thesis, University of Trento. Defense: May 2021.
- Claudio Meggio *A stochastic SEIR household model for COVID-19 epidemic including lockdown effects*, MSc Thesis, University of Turin. Defense: June 2021.

Visiting

- Sep 2024 **Short-Term Scientific Mission**, *Institute of Mathematics and Informatics Bulgarian Academy of Sciences*, Sofia, Bulgaria.
- Jan-Apr 2019 **Exchange program MSc**, *University of Waterloo*, Waterloo, Ontario, Canada.

Communications

- 20-24 Jan 2025 **Invited speaker**, *16th Conference on Dynamical Systems Applied to Biology and Natural Sciences-DSABNS*, Part of the minisymposium Minisymposium “Dynamical Systems applied on Biology and Natural Sciences”.
Napoli (IT)
- 11-13 Dec 2025 **Invited speaker**, *Working Group ENOTTA meeting*.
Paphos (CY)
- 10-12 July 2024 **Invited speaker**, *GIMC SIMAI YOUNG 2024*.
Napoli (IT)
Title: “(Mis)-information spreading: a geometric analysis of a SIRS epidemic model”
Part of the minisymposium “MS01: Mathematical Models for Socio-Epidemiological Dynamics”
- 6-9 Feb 2024 **Organizer and speaker (MiniSymposium) and poster presentation**, *15th Conference on Dynamical Systems Applied to Biology and Natural Sciences-DSABNS*.
Caparica (PT)
Title of MiniSymposium: “Slow-fast systems in biology: geometric singular perturbation theory applications and new perspectives”
Title of Poster: “A geometric analysis of the impact of large but finite switching rates on vaccination evolutionary games”
- 29-31 Jan 2024 **Organizer and speaker**, *WORKSHOP-Integrated Mathematical approaches to Socio-Epidemiological Dynamics*.
Trento (IT)
Title: “A geometric analysis of the SIRS compartmental model with fast information and misinformation spreading”
- 28 Aug-1 Sep 2023 **Invited speaker**, *Bi-annual congress of the Italian Society of Applied and Industrial Mathematics (SIMAI)*.
Matera (IT)
Title: “A geometric analysis of the SIRS model with secondary infections”
Part of the minisymposium “MS03: Recent Advances on the mathematical and numerical modeling of epidemics”
- 19-21 June 2023 **Poster presentation**, *Workshop on epidemic modelling: current challenges*.
Girona (ES)
Title: “A geometric analysis of the impact of large but finite switching rates on vaccination evolutionary games”
- 18-19 May 2023 **Invited speaker**, *Workshop Modellistica Socio-Epidemiologica*.
Napoli (IT)
Title: “A geometric analysis of the impact of large but finite switching rates on vaccination evolutionary games”
- 19-23 Sep 2022 **Poster presentation**, *12th European Conference on Mathematical and Theoretical Biology-ECMTB 2022*.
Heidelberg (DE)
Title: “Global stability of SAIRS epidemic models”
- 26-29 July 2022 **Contributed speaker**, *10th Vienna International Conference on Mathematical Modelling-MATHMOD 2022*.
Wien (A)
Title: “Global analysis of SAIRS-type epidemic models”
- 7-8 Apr 2022 **Invited speaker**, *Kick-off Meeting PRIN2020*.
Pavia (IT)
Title: “Global stability of SAIRS epidemic models”
- 8-11 Feb 2022 **Contributed speaker**, *13th Conference on Dynamical Systems Applied to Biology and Natural Sciences-DSABNS*.
online
Title: “Global stability of SAIRS epidemic models”
- 7 Feb 2022 **Organizer and speaker**, *Ph.D. Opening Day 2022 at University of Trento*.
online
Title: “Global stability of SAIRS epidemic models”
- 10 June 2021 **Invited speaker**, *Ph.D. Seminars at University of Groningen*.
online
Title: “Time-varying epidemic transmission in heterogeneous networks”
- 4-7 Feb 2020 **Poster presentation**, *11th Conference on Dynamical Systems Applied to Biology and Natural Sciences-DSABNS*.
Trento (IT)
Title: “Time-varying epidemic transmission in heterogeneous networks”

Attended conferences, workshops and schools

- 29-31 Jan 2024 **WORKSHOP-Integrated Mathematical approaches to Socio-Epidemiological Dynamics**.
Trento (IT)
- 20-25 Nov 2023 **Advanced School on “Delays and structures in dynamical systems: modeling, analysis and numerical methods”**, *CISM (International Centre for mechanical sciences, Udine, Italy)*.
Udine (IT)

- 9-13 May 2022 **Summer School “Stochastic modelling in the life sciences”**, *Hausdorff Research Institute for Mathematics*, Bonn, Germany.
- 29 Nov-1 Dec 2021 **Karlstad Autumn School “Interacting Particles meet Homogenization and Measure Theory”**, *Karlstad University*, Karlstad, Sweden.
- 30 Aug-3 Sep 2021 **High-Performance Computing summer school 2021, Project M&S: Modelling and Simulation**, *University of Trento*, Trento, Italy.
- 5-10 July 2021 **Networks 2021: A Joint Sunbelt and NetSci Conference**.
online
- 2-5 Feb 2021 **12th Conference on Dynamical Systems Applied to Biology and Natural Sciences-DSABNS**.
online
- 7-11 Dec 2020 **Conference on Complex Systems 2020-CSS2020**.
online
- 18-20 May 2020 **Workshop Modeling the propagation of Covid-19**.
online
- 17-18 Feb 2020 **ISI Workshop on Learning, Algorithms and Networks**.
Turin (IT)

Responsibilities

- 2023 **Scientific committee**, *Complex Networks 2023*, Menton Riviera, France.
- Nov 2021-Dec 2022 **Member of the Committee for the Open Science**, *University of Trento*.
- Dec 2020-Dec 2022 **Member of the Committee of PhD students and grant holders**, *University of Trento*.
- Dec 2020-Dec 2022 **Elected representative for PhD students of the Dept. of Mathematics**, *University of Trento*.

Organization

- 6-9 Feb 2024 **Minisymposium: “Slow-fast systems in biology: geometric singular perturbation theory applications and new perspectives”**, *15th Conference on Dynamical Systems Applied to Biology and Natural Sciences-DSABNS*.
Caparica (PT)
- 29-31 Jan 2024 **WORKSHOP-Integrated Mathematical approaches to Socio-Epidemiological Dynamics**.
Trento (IT)
- Sep 2020-Dec 2022 **Doc in Progress**, *Periodic seminars at the Dept. of Mathematics*, *University of Trento*.
Trento (IT)
- 7 Feb 2022 **PhD Opening Day 2022**, *Dept. of Mathematics*, *University of Trento*.
Trento (IT)
- 11 Mar 2021 **PhD Opening Day 2021**, *Dept. of Mathematics*, *University of Trento*.
Trento (IT)

Reviewing

- 2024 *Journal of Mathematical Biology*, *Mathematics and Computers in Simulation*
- 2023 *Waves in Random and Complex Media*, *TWMS Journal of Applied and Engineering Mathematics*, *Mathematics and Computers in Simulation*, *Applied Mathematical Modelling*, *Physica D: Nonlinear Phenomena*, *Applied Mathematica*
- 2022 *Journal of Mathematical Biology*, *Rendiconti del Circolo Matematico di Palermo Series 2*, *Nonlinear Analysis: Real World Applications*
- 2021 *Journal of Biological Dynamics*, *Rendiconti del Circolo Matematico di Palermo Series 2*

Awards and Research funding

- Apr 2024 **Research grant - Short-Term Scientific Mission for COST Action CA21147 “European Network on Optimising Treatment with Therapeutic Antibodies in chronic inflammatory diseases” (ENOTTA)**, *COST Action*.

- Feb 2024 **Research Fellowship within the project Progetto H2020-ORCHESTRA**, *University of Bologna*, Bologna, Italy.
- Feb 2023 **Research Fellowship within the project Grant PRIN-MIUR No. 2020JLWP23 (CUP:E15F21005420006)**, *University of Trento*, Trento, Italy.
- July 2022 **Travel Support for ECMTB 2022**, *European Society for Mathematical and Theoretical Biology*.
- June 2022 **Full Grant for the school “Mathematical modeling for epidemiology: analysis, simulation and forecasting”**, *Fondazione CIME*.
- Apr 2022 **Travel support for the school “Stochastic modelling in the life sciences”**, *Hausdorff Research Institute for Mathematics*.
- Dec 2020 **Scholarships for Events on Complex Systems (SECS)**, *Young Researchers of the Complex Systems Society*.
- Nov 2019 **3 years PhD Research Fellowship MUR-funded Department of Excellence**, *University of Trento*, Trento, Italy.
- Dec 2019 **Financial support for the Extra-Erasmus mobility**, *University of Turin*, Turin, Italy.
Exchange program at University of Waterloo (CA)

Membership

- Apr 2024-Present **ENOTTA WP2**, *COST Action CA21147 “Eu- ropean Network on Optimising Treatment with Therapeutic Antibodies in chronic inflammatory diseases”*.
- Mar 2024-Present **MSE - UMI**, *Modellistica Socio-Epidemiologica (Social-Epidemiological Modelling) of the Unione Matematica Italiana*.
- Mar 2024-Present **EWM**, *European Women in Mathematics*.
- Jan 2022-Present **“GNAMPA” Indam**, *Gruppo Nazionale per l’Analisi Matematica, la Probabilità e le loro Applicazioni*.
- June 2022-Present **ESMTB**, *European Society for Mathematical and Theoretical Biology*.
- Dec 2020-Dec 2021 **Complex Systems Society**.

IT skills

- Programming Python, R, MATLAB, Maple, HTML, Bash
- Operative systems Windows, Linux
- Softwares LaTeX, Word, Excel, PowerPoint

Languages

Italian (Mother tongue), English (B2), Spanish (A2)

Publications

1. **Bulai, I. M., Sensi, M. and Sottile, S.**, *A geometric analysis of the SIRS compartmental model with fast information and misinformation spreading*, *Chaos, Solitons and Fractals*, (2024), Vol. 185, pp. 115104, <https://doi.org/10.1016/j.chaos.2024.115104>.
2. **Kaklamanos, P., Pugliese, A., Sensi, M. and Sottile, S.**, *A geometric analysis of the SIRS model with secondary infections*, *SIAM Journal on Applied Mathematics* (2024), Vol. 84, Issue 2, pp. 661 - 686, <https://doi.org/10.1137/23m1565632>.
3. **Della Marca, R., d’Onofrio, A., Sensi, M. and Sottile, S.**, *A geometric analysis of the impact of large but finite switching rates on vaccination evolutionary games*, *Nonlinear Analysis: Real World Applications* (2024), Vol. 75, 103986, <https://doi.org/10.1016/j.nonrwa.2023.103986>.
4. **Cangiotti, N., Capolli, M., Sensi, M. and Sottile, S.**, *A survey on Lyapunov functions for epidemic compartmental models*, *Bollettino dell’Unione Matematica Italiana* (2023), <https://doi.org/10.1007/s40574-023-00368-6>.
5. **Ottaviano, S., Sensi, M. and Sottile, S.**, *Global stability of multi-group SAIRS epidemic*

models, Mathematical Methods in the Applied Sciences (2023), <https://doi.org/10.1002/mma.9303>.

6. **Calabrò, G.E. et al.**, *Health Technology Assessment: a value-based tool for the evaluation of healthcare technologies. Reassessment of the cell-culture-derived quadrivalent influenza vaccine: Flucelvax Tetra® 2.0*, Journal of Preventive Medicine and Hygiene (2022), Vol. 63, Issue 4 Suppl. 1, pp. E1-E138, <https://doi.org/10.15167/2421-4248/jpmh2022.63.4S1>.
Rizzo, C., Saraceno, G., Sottile, S., Abreha, F.M. and Pugliese A., Chapter 5: “*Valutazione economica dell'introduzione del nuovo vaccino antinfluenzale quadrivalente da coltura cellulare nel contesto di cura italiano (update da nuova indicazione)*”.
7. **Fochesato, A., Sottile, S., Pugliese, A., Márquez-Peláez, S., Toro-Díaz, H., Gani, R., Alvarez, P. and Ruiz-Aragón, J.**, *An Economic Evaluation of the Adjuvanted Quadrivalent Influenza Vaccine Compared with Standard-Dose Quadrivalent Influenza Vaccine in the Spanish Older Adult Population*, Vaccines (2022), Vol. 10, pp. 1360, <https://doi.org/10.3390/vaccines10081360>.
8. **Sottile, S., Kahramanoğulları, O. and Sensi, M.**, *How network properties and epidemic parameters influence stochastic SIR dynamics on scale-free random networks*, Journal of Simulation (2022), <https://doi.org/10.1080/17477778.2022.2100724>.
9. **Ottaviano, S., Sensi, M. and Sottile, S.**, *Global stability of SAIRS epidemic models*, Nonlinear Analysis: Real World Applications (2022), Vol. 26, pp. 103501, <https://doi.org/10.1016/j.nonrwa.2021.103501>.
10. **Boccalini, S. et al.**, *Health Technology Assessment (HTA) of the introduction of influenza vaccination for Italian children*, Journal of Preventive Medicine and Hygiene (2021), Vol. 62, Issue 2 Suppl. 1, pp. E1-E128, <https://doi.org/10.15167/2421-4248/jpmh2021.62.2s1>.
Rizzo, C., Sottile, S. and Pugliese A., Chapter 6: “*Valutazione economica dell'introduzione del vaccino antinfluenzale vivo attenuato (Fluenz Tetra®) nella popolazione giovanile italiana (2-6 anni)*”.
11. **Sottile, S. and Liu, X.**, *Time-varying epidemic transmission in heterogeneous networks and applications to measles*, Journal of Biological Systems (2020), Vol. 28, No. 4, pp. 1-26, <https://doi.org/10.1142/S0218339020500217>.

Preprints

1. **Achterberg, M.A., Sensi, M. and Sottile, S.**, *A minimal model for multigroup adaptive SIS epidemics.*, 2024, Preprint, <https://arxiv.org/pdf/2407.17639>
2. **Pugliese, A. and Sottile, S.**, *Inferring the COVID-19 infection curve in Italy*, 2020, Preprint, <https://arxiv.org/pdf/2004.09404.pdf>