Pasquale Ambrosio

Curriculum Vitae

Employment

present - **Adjunct Professor**, University of Naples "Federico II" (Italy).
11/03/2025 Analisi Matematica 2 (Calculus II) for Chemical Engineering/Materials Science and Engineering/Management Engineering.

present - **Postdoctoral researcher**, Università di Bologna (Italy).
01/11/2024 Supervisor: Prof. Giovanni Cupini.

Education

10/2024 **Ph.D. in Mathematics**
11/2021 Università degli Studi di Napoli "Federico II" (Italy).

- Thesis: *Regularity results for solutions to some classes of strongly degenerate elliptic and parabolic problems*
- Supervisor: Prof. Antonia Passarelli di Napoli
- Date of defense: January 21, 2025
- Grade: Excellent with honors

10/2021 **M.Sc. in Mathematics**
09/2017 Università degli Studi di Napoli "Federico II" (Italy).

- Thesis: *Besov regularity for congested traffic problems with subquadratic growth conditions*
- Supervisor: Prof. Antonia Passarelli di Napoli
- Grade: 110/110 cum laude

05/2013 **B.Sc. in Mathematics**
09/2009 Università degli Studi di Napoli "Federico II" (Italy).

- Thesis: *A geometric model for the dynamics of the Lorenz system*
- Supervisor: Prof. Bruno Buonomo
- Grade: 110/110 cum laude

07/2009 **Scientific High School**
09/2004 Liceo Scientifico "C. Urbani", San Giorgio a Cremano (Italy).

- Grade: 100/100 cum laude

Research and study visits

02/01 - **Université Paris Dauphine-PSL**, (France).
02/04/2024 Supervisor: Prof. Guillaume Carlier.
Research on the asymptotic behaviour of Wardrop equilibria for congested traffic problems on sequences of random geometric graphs.

21/11 - **University of Salzburg**, (Austria).
05/12/2022 Supervisor: Prof. Verena Bögelein.
Research on gradient bounds for strongly singular or degenerate parabolic systems.

Funded Projects

- 2025 **INdAM-GNAMPA** Project
  Role: Participant
  Subject: Regolarità ed esistenza per operatori anisotropi
  Coordinator: Dr. Simone Ciani (University of Bologna)
  Funding: 3500 euros

- 2024 **PRIN2022_CITTI** project "Regularity problems in sub-Riemannian structures"
  Role: Research grant winner
  Subject: Sub-Riemannian PDEs, minima of functionals and application to brain modelling
  Coordinator: Prof. Giovanna Citti (University of Bologna)
  Funding related to the postdoctoral research grant won in 2024.

- 2024 **LYSM** Project
  Role: Participant
  Funding connected to the research visit at the University Paris Dauphine-PSL (January-April 2024).

- 2024 **INdAM-GNAMPA** Project
  Role: Participant
  Subject: Fenomeno di Lavrentiev, Bounded Slope Condition e regolarità per minimi di funzionali integrali con crescite non standard e lagrangiane non uniformemente convesse
  Coordinator: Prof. Giulia Treu (University of Padova)
  Funding: 4000 euros

- 2023 **INdAM-GNAMPA** Project
  Role: Participant
  Subject: Risultati di regolarità per PDEs in spazi di funzione non-standard
  Coordinator: Dr. Claudia Capone (CNR)
  Funding: 2500 euros

- 2022 **FWF** Project P36295-N
  Role: Participant
  Coordinator: Prof. Verena Bögelein (University of Salzburg)
  Funding connected to the research visit at the University of Salzburg (November and December 2022).

Fellowships and Awards

- Doctoral scholarship at the University of Naples "Federico II" (XXXVII cycle) provided by the Italian Ministry of Education, University and Research (MIUR) (01/11/2021 - 31/10/2024).
- Tutoring grants awarded by the University of Naples "Federico II" (A.Y. 2022-2023, 2023-2024).
- CIME funding connected to the participation in the Summer School "Geometric and analytic aspects of functional variational principles" (Cetraro, Italy, 27/06/2022 to 01/07/2022).
- A.Di.S.U grants for university study, on account of academic merits (A.Y. 2010-2011, 2011-2012, 2012-2013).
- Excellent student award for high school degree S.Y. 2008-2009, by Liceo Scientifico "C. Urbani", San Giorgio a Cremano (Italy).

Publications

Publications in Scientific Journals

7. P. Ambrosio, G. Cupini and E. Mascolo, Regularity of vectorial minimizers for non-uniformly elliptic anisotropic integrals, *Nonlinear Analysis* (2025). **Accepted for publication**. Available at: `https://arxiv.org/abs/2503.18917`.

6. P. Ambrosio, Sharp Sobolev regularity for widely degenerate parabolic equations, *Calc. Var.* **64**, 32 (2025). DOI: `https://doi.org/10.1007/s00526-024-02894-3`.

5. P. Ambrosio and F. Bäuerlein, Gradient bounds for strongly singular or degenerate parabolic systems, *J. Differ. Equ.*, **401** (2024). DOI: https://doi.org/10.1016/j.jde.2024.05.008.
4. P. Ambrosio, S. Cuomo and M. De Rosa, A physics-informed deep learning approach for solving strongly degenerate parabolic problems, *Engineering with Computers*, (2024). DOI: https://doi.org/10.1007/s00366-024-01961-9.
3. P. Ambrosio and A. Passarelli di Napoli, Regularity results for a class of widely degenerate parabolic equations, *Adv. Calc. Var.*, (2023). DOI: https://doi.org/10.1515/acv-2022-0062.
2. P. Ambrosio, Fractional Sobolev regularity for solutions to a strongly degenerate parabolic equation, *Forum Math.*, (2023). DOI: https://doi.org/10.1515/forum-2022-0293.
1. P. Ambrosio, Besov regularity for a class of singular or degenerate elliptic equations, *J. Math. Anal. Appl.*, **505**(2) 125636 (2022). DOI: https://doi.org/10.1016/j.jmaa.2021.125636.

Preprints

1. P. Ambrosio, A.G. Grimaldi and A. Passarelli di Napoli, On the second-order regularity of solutions to widely singular or degenerate elliptic equations, *ArXiv* (2025). Available at: https://arxiv.org/abs/2401.13116.

PhD Thesis

P. Ambrosio, Regularity results for solutions to some classes of strongly degenerate elliptic and parabolic problems, (2025). DOI: http://dx.doi.org/10.13140/RG.2.2.22693.61926.
Also available at: https://hal.science/tel-04962875.

Conferences, Workshops and Schools

Invited talks

June 2025 **"Local boundedness of vector-valued minimizers for anisotropic integral functionals"**, talk at the "Workshop on Variational Problems and PDEs", Naples.

May 2025 **"A journey into strongly degenerate elliptic and parabolic problems: what happens to regularity?"**, seminar at the University of Rome Tor Vergata, Rome.

Nov 2024 **"Regularity results for solutions to some classes of strongly degenerate elliptic and parabolic problems"**, seminar at the Department of Mathematics in Bologna.

Feb 2024 **"Regularity results for weak solutions to widely degenerate parabolic problems"**, talk at the workshop "Three days on Regularity Results for Variational Problems and PDEs", Modena.

Dec 2023 **"Higher regularity for weak solutions to strongly degenerate parabolic problems"**, talk held on the occasion of the PhD Day, Naples.

April 2023 **"Regularity results for a class of strongly degenerate parabolic equations"**, seminar in Naples.

Dec 2022 **"Regularity results for some classes of strongly singular or degenerate PDEs"**, talk held on the occasion of the PhD Day, Naples.

Nov 2022 **"Regularity results for some classes of strongly singular or degenerate elliptic and parabolic equations"**, seminar in Salzburg.

Dec 2021 **"Besov regularity for a class of singular or degenerate elliptic equations"**, talk at the workshop "Two days on Regularity Results for Variational problems and PDEs", Modena.

Contributed talks and posters

May 2025 **"Regularity of vectorial minimizers for non-uniformly elliptic anisotropic integrals"**, talk at the C.I.M.E. Summer School "Existence and regularity for non uniformly elliptic and parabolic problems under (p, q) and general growth conditions", Montecatini Terme.

Sep 2024 **"Gradient bounds for strongly singular or degenerate parabolic systems"**, poster at the workshop "Recent Advances in Nonlinear PDEs and Applications", Paestum.

July 2024 **"A physics-informed deep learning approach for solving strongly degenerate parabolic problems"**, talk at the workshop GIMC SIMAI Young 2024, Naples.

May 2024 **"Sharp second-order regularity for widely degenerate elliptic equations"**, talk at the "International Conference on Elliptic and Parabolic Problems", Gaeta.

June 2023 **"A strongly degenerate parabolic equation in gas filtration problems"**, talk at the "International Conference on Approximation Theory and Applications", Cetraro.

May 2023 **"Regularity results for a class of widely degenerate parabolic equations"**, poster at the "International Conference on Elliptic and Parabolic Problems", Naples.

Feb 2023 **"Besov regularity for a class of singular or degenerate elliptic equations"**, poster at the workshop "Variational models in Materials Science", Naples.

Sep 2022 **"Besov regularity for a class of singular or degenerate elliptic equations"**, talk at "Optimal Transport and Uncertainty – second workshop", Naples.

June 2022 **"Regularity results for some classes of strongly singular/degenerate elliptic or parabolic equations"**, talk at the conference "Advances in Calculus of Variations", Naples.

Nov 2021 **"Besov regularity for a class of singular or degenerate elliptic equations"**, poster at the online conference "New and old function spaces in the theory of PDEs and Nonlinear Analysis" organized by the Accademia Nazionale dei Lincei, Rome.

Teaching Experience

University courses

present - 03/2025 **Adjunct Professor**, "Analisi Matematica 2" (Calculus II) for Chemical Engineering/Materials Science and Engineering/Management Engineering (University of Naples "Federico II").

Tutoring classes

06/2024 10/2023 **Tutor**, "Istituzioni di Analisi Superiore" (Fundamentals of Advanced Mathematical Analysis) for Mathematics (University of Naples "Federico II").

06/2023 11/2022 **Complementary tutor**, "Analisi Matematica 2" (Calculus II) for Mathematics (University of Naples "Federico II").

Spring 2023 **Tutor**, "Analisi Matematica 2" (Calculus II) for Civil, Construction and Environmental Engineering (University of Naples "Federico II").

02/2023 10/2022 **Tutor**, "Analisi Matematica 1" (Calculus I) for Civil, Construction and Environmental Engineering (University of Naples "Federico II").

Spring 2022 **Complementary tutor**, "Analisi Matematica 1" (Calculus I) for Mathematics (University of Naples "Federico II").

Professional service

Conference organizer

18/06/2025 10/12/2024 **Three Days in Sub-Riemannian Geometry**, June 16-18, 2025. Bologna, Italy. Co-organized with A. Baldi, G. Citti, M. Galeotti, V. Liontou, A. Montanari, R. Monti, D. Morbidelli, A. Pinamonti, F. Serra Cassano, S. Verzellesi and G. Vianello.

Seminar organizer

06/2025 09/2024 **Junior Seminars on Mathematical Analysis**, University of Naples "Federico II", Italy. Co-organized with P. Acampora, D. Castorina and C. Trombetti. Seminar series for PhD students and postdoctoral researchers in Mathematical Analysis.

Referee for scientific publications

present - 22/09/2024 **Reviewer**, for *Journal of Mathematical Analysis and Applications* (Elsevier).

Further academic activities

16/02/2023 **Local collaborator**, project "Olimpiadi della Matematica 2023" (University of Naples "Federico II", Italy).

Research interests

My current research activity focuses on three main topics:

- Regularity of solutions to strongly singular or degenerate elliptic PDEs;
- Existence and regularity of solutions to widely singular or degenerate parabolic equations and systems;
- Regularity for local minimizers of non-uniformly elliptic anisotropic integrals.

Memberships

present - 01/01/2022 **Member of the Gruppo Nazionale per l'Analisi Matematica, la Probabilità e le loro Applicazioni (GNAMPA) of the Istituto Nazionale di Alta Matematica (INdAM)**, Rome (Italy).

present - 01/01/2022 **Member of the Unione Matematica Italiana (UMI)**, Bologna (Italy).

Languages

- Italian: Mother tongue
- English: Advanced
- French: Advanced

Last updated: June 24, 2025