

# 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

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

2. 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>.
1. P. AMBROSIO, G. CUPINI AND E. MASCOLO, Regularity of vectorial minimizers for non-uniformly elliptic anisotropic integrals, *ArXiv* (2025). Available at: <https://arxiv.org/abs/2503.18917>.

## 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

- 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 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 - **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 **Tutor**, “Istituzioni di Analisi Superiore” (Fundamentals of Advanced Mathematical Analysis)
- 10/2023 for Mathematics (University of Naples “Federico II”).
- 06/2023 **Complementary tutor**, “Analisi Matematica 2” (Calculus II) for Mathematics (University of
- 11/2022 Naples “Federico II”).
- Spring 2023 **Tutor**, “Analisi Matematica 2” (Calculus II) for Civil, Construction and Environmental Engineering (University of Naples “Federico II”).
- 02/2023 **Tutor**, “Analisi Matematica 1” (Calculus I) for Civil, Construction and Environmental Engineering (University of Naples “Federico II”).
- 10/2022
- Spring 2022 **Complementary tutor**, “Analisi Matematica 1” (Calculus I) for Mathematics (University of Naples “Federico II”).

## Professional service

### Conference organizer

- present - **Three Days in Sub-Riemannian Geometry**, June 16-18, 2025. Bologna, Italy. Co-organized
- 10/12/2024 with M. Galeotti, V. Lontou, S. Verzellesi and G. Vianello.

### Seminar organizer

- present - **Junior Seminars on Mathematical Analysis**, University of Naples “Federico II”, Italy. Co-
- 09/2024 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 - **Reviewer**, for *Journal of Mathematical Analysis and Applications* (Elsevier).
- 22/09/2024

### 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 - **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).  
01/01/2022

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

## Languages

- ITALIAN: Mother tongue
- ENGLISH: Advanced
- FRENCH: Advanced

Last updated: June 2, 2025