

# Curriculum Vitae of Giuseppe Buttazzo

Name: Buttazzo

First name: Giuseppe

Date of birth: May 22, 1954

Place of birth: Castri di Lecce (LE) - Italy

Current position: Full Professor of Mathematical Analysis at the "Dipartimento di Matematica" of University of Pisa (Italy)

Personal: Married, with three children

Military service: Accomplished

Languages: Italian (native language), French (spoken and written), English (spoken and written)

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Professional societies: Unione Matematica Italiana

## Academic Titles and Career

July 1972: High school Diploma (Maturità di Liceo Scientifico).

October 1972: Beginning of the first year in Mathematics at the University of Pisa.

October 1973: Winning a competition for a student position in Mathematics at the Scuola Normale Superiore di Pisa.

July 1976: Taking the degree certificate (Laurea) in Mathematics at the University of Pisa with full marks (110/110 cum laude), and the Diploma in Mathematics at the Scuola Normale Superiore di Pisa. Title of the thesis: *Su un tipo di convergenza variazionale*, adviser: Prof. E. De Giorgi.

December 1976: Winning a competition for a Ph. D. position (Perfezionando) in Mathematics at the Scuola Normale Superiore di Pisa; research adviser: Prof. E. De Giorgi.

Academic Year 1978–1979: One year of study and research in Paris at the Ecole Normale Supérieure de St. Cloud.

September 1981: Winning a competition for a permanent position (Ricercatore Confermato) in Mathematics at the Scuola Normale Superiore di Pisa.

December 1986: Winning a national competition for a Full Professor position in Mathematical Analysis.

May 16, 1987–October 31, 1990: Full professor of Mathematical Analysis at University of Ferrara.

January 3–October 31, 1990: President of the "Consiglio di Corso di Laurea in Matematica" of University of Ferrara.

From November 1, 1990: Full professor of Mathematical Analysis at University of Pisa.

## Lectures given

I have given lectures at many Universities in Italy and abroad, among which

Italy: Università di Cassino, Università di Cosenza, Center “E. Majorana” of Erice, Università di Ferrara, Università di Firenze, Università di Genova, Università di Lecce, Politecnico di Milano, Università di Modena, Università di Napoli, Università di Padova, Università di Parma, Università di Pavia, Università di Perugia, Center “E. De Giorgi” of Pisa. Università di Pisa, Scuola Normale Superiore di Pisa, Scuola Superiore S. Anna di Pisa, Università di Roma I, Università di Roma II, Università di Salerno, Politecnico di Torino, Università di Trento, S.I.S.S.A. di Trieste, Università di Udine;

Algeria: Ecole Normale Supérieure de Kouba;

Australia: Australian National University of Canberra;

Austria: University of Graz;

Bulgaria: Academy of Sciences, University of Sofia;

Canada: Université de Montreal, University of Toronto;

Chile: Universidad de Chile (Santiago);

Denmark: Technical University of Denmark (Lyngby), University of Copenhagen;

France: Université de Avignon, Université de Besançon, Université de Bordeaux I, Université de Chambéry, Université de Grenoble, Université de Limoges, C.I.R.M. de Marseille-Luminy, L.M.A. (CNRS) de Marseille, Université de Metz, Université de Montpellier, Université de Nice, CER-MICS of Paris, Collège de France (Paris), ENSTA ParisTech (Paris), Institut Henri Poincaré (Paris), Université de Paris VI, Université de Paris XII, Université de Paris-Dauphine, Université de Paris-Sud, Université de Perpignan, Université de Poitiers, Ecole Normale Supérieure de Cachan (Paris), Ecole Normale Supérieure de Cachan (Rennes), Université de Rennes I, Université de Toulon et du Var, Université de Toulouse, Université de Tours;

Germany: University of Bonn, University of Erlangen, University of Heidelberg, University of Köln, Technische Universität München, University of Saarbrücken, Mathematical Institute of Oberwolfach, Max-Planck Institute of Lepzig, University of Trier;

Great Britain: University of Bristol, Heriot-Watt University of Edinburgh, ICMS of Edinburgh, University of Swansea;

Israel: Technion of Haifa, Weizmann Institute of Rehovot;

Netherland: Royal Academy of Amsterdam (KNAW);

Norway: University of Narvik;

Philippines: University of Manila;

Poland: University of Krakow, Mathematical Research Center of Bedlewo;

Portugal: University of Aveiro, University of Faro, C.M.A.F. of Lisbon, Technical University of Lisbon, Universidade Nova de Lisboa;

Romania: University of Timisoara;

Spain: University of Baleares, Benasque Center for Science, ETSI Industriales de Ciudad Real, University Complutense of Madrid, University of Sevilla;

Sweden: Institut Mittag-Leffler;

Switzerland: University of Basel, E.P.F. Lausanne, ETH Zürich, University of Zürich;

Taiwan: Academia Sinica of Taipei;

U.S.A.: Akron University, MSRI of Berkeley, Kennesaw University, University of Minnesota, Courant Institute of New York University, Carnegie-Mellon University of Pittsburgh, IPAM of Los Angeles.

## Awards and Honours

- Santaló lecturer for 2010 at Universidad Complutense de Madrid;
- Winner of “*Premio Luigi e Wanda Amerio 2011*”, awarded by the “Istituto Lombardo Accademia di Scienze e Lettere”;
- Winner of “*Premio Città di Castri 2012*”, awarded by the town of Castri di Lecce.

## Scientific Research

My scientific research has been mainly devoted to the following fields, in which I published more than 170 papers and 19 books (see list of publications).

- General theory of  $\Gamma$ -convergence
- $\Gamma$ -convergence for functionals of the calculus of variations
- Bounce problems on Riemannian manifolds
- Semicontinuity and relaxation for integral functionals
- Optimal control problems: relaxed controls and limit problems
- Continuous operators between function spaces
- Singular perturbation problems
- Integral representation theory for local functionals
- Limit problems and asymptotic analysis in the continuum mechanics
- Existence theory for unilateral problems in linear and nonlinear elasticity
- Macroscopic behaviour of elastic periodic networks: homogenization
- Variational problems with a lack of coercivity
- Quasilinear elliptic equations
- Functionals defined on the space of measures
- The Lavrentiev Phenomenon in the calculus of variations
- Shape optimization problems
- Optimization problems in mass transportation theory

## Didactic Activity

My didactic activity has been mainly concerned with the teaching in the following courses:

- Tutorial course for students of the first year in Mathematics of Scuola Normale Superiore di Pisa
- Collaboration to the course *Analisi Matematica* held by Prof. Ennio De Giorgi at Scuola Normale Superiore di Pisa
- *Analisi Matematica I* (basic calculus for functions of one variable)
- *Analisi Matematica II* (advanced calculus)
- *Istituzioni di Matematiche* (general mathematical basic tools)
- *Calculus of Variations* (Research course at CMAF of Lisbon 1985–1986, Ph. D. course at University of Genova 1987–1988, Ph. D. course at University of Köln 1995)
- *Analisi Superiore* (advanced course on Mathematical Analysis)
- *Analisi Funzionale* (advanced course on Functional Analysis)
- *Teoria delle Funzioni* (advanced course on Mathematical Analysis and Function Theory)
- *Gamma-convergence and Some Applications* (ICTP Summer School course, Trieste 1993)
- *Shape Optimization Problems* (research course at Bonnevaux 1994, Ph. D. course at Bordeaux 1995, research course at Limoges-Poitiers 1996, research course at Besançon 1998, research course at Santiago of Chile 1998, CIMPA course at Manila 2000)
- *Optimal Control Problems* (“NATO Summer School on Control Theory”, Montreal 1998)
- *Variational methods in some optimization problems* (Ph. D. course, Scuola Normale Superiore di Pisa 2001)

- *Transport problems and shape optimization theory* (CIME course, Martina Franca 2001)
- *Analytical aspects of shape optimization problems* (Timisoara, Romania 2011)
- *Topics in shape optimization* (ETSI Industriales de Ciudad Real, Spain 2012)
- *Topics in shape optimization* (Département de Mathématiques, Université de Paris-Sud, France 2013)

## Other Activities

- Advisor of several research theses, at “Laurea” level and at Ph. D. level.

### LAUREA THESES:

- L. Freddi: *Funzionali definiti sullo spazio delle misure ed applicazioni a problemi ellittici degeneri*. Università di Ferrara, 1987-1988.
- O. Ascenzi: *Regolarità delle soluzioni di problemi del calcolo delle variazioni in dimensione uno*. Università di Pisa, 1989-1990.
- S. Parma: *Problemi di minimo su spazi di funzioni convesse*. Università di Ferrara, 1990-1991.
- G. Mazzini: *Teoremi di esistenza per una classe di funzionali non coercivi*. Università di Pisa, 1991-1992.
- M. Guidorzi: *Problemi di ottimizzazione di forma attraverso il metodo dell’omogeneizzazione*. Università di Ferrara, 1992-1993.
- F. Nicolai: *Un modello variazionale per l’ottimizzazione di profili aerodinamici*. Università di Pisa, 1993-1994.
- I. Fragalà: *Rilassamento di alcuni problemi variazionali con mancanza di compattezza*. Università di Pisa, 1994-1995.
- L. De Pascale: *Spazi di Sobolev su spazi metrici*. Università di Pisa, 1995-1996.
- P. Guasoni: *Problemi di ottimizzazione di forma su classi di insiemi convessi*. Università di Pisa, 1995-1996.
- E. Ricci: *Problemi di controllo ottimo ed applicazioni in campo agrario*. Università di Pisa, 1999-2000.
- A. Brancolini: *Problemi di ottimizzazione in teoria del trasporto e applicazioni*. Università di Pisa, 2001-2002.
- F. Santambrogio: *Misure ottime per costi di trasporto e funzionali locali*. Università di Pisa, 2002-2003.
- R. Farolfi: *Variational and numerical methods for structural optimization: a  $p$ -Laplacian approximation for the minimum compliance problem*. Università di Pisa, 2006-2007.
- V. Rispoli: *I problemi di “posizionamento” e di “irrigazione” ottimi*. Università di Pisa, 2006-2007.
- B. Lenzo: *Problemi di posizionamento ottimo di punti in domini euclidei*. Università di Pisa, 2007-2008.
- M. Grava: *Ottimizzazione di forma per una colonna rispetto al carico critico*. Università di Pisa, 2008-2009.
- Xin Yang Lu: *Problema di Monge-Kantorovich e equazioni del  $p$ -laplaciano*. Università di Pisa, 2008-2009.
- I. Lucardesi: *Posizionamento ottimo con sorgenti di segno qualsiasi*. Università di Pisa, 2008-2009.
- M. Monteverde: *Sul problema di Newton del profilo ottimo con vincoli di portanza*. Università di Genova, 2011-2012.

### PH. D. THESES:

- Loris Faina: *Some nonconvex variational problems in  $BV$  spaces*. SISSA-Trieste, 1994
- Lorenzo Freddi: *Rilassamento e convergenza di problemi di controllo ottimo*. Università di Pisa, 1994.
- Marino Belloni: *Rilassamento di problemi variazionali con fenomeno di Lavrentiev*. Università di Pisa, 1996.

- Paola Trebeschi: *Esistenza di soluzioni in problemi di ottimizzazione di forma e ostacoli*. Università di Pisa, 1998.
- Ariela Briani: *Hamilton-Jacobi-Bellman equations and  $\Gamma$ -convergence for optimal control problems*. Università di Pisa, 1999.
- Ilaria Fragalà: *Tangential calculus and variational integrals with respect to a measure*. Università di Pisa, 2000.
- Luigi De Pascale: *Morse-Sard theorem in Sobolev spaces, transport problems and applications*. Università di Pisa, 2001.
- Francesca Prinari: *Calculus of variations for supremal functionals*. Università di Pisa, 2003.
- Andrea Davini: *Finsler metrics in optimization problems and Hamilton-Jacobi equations*. Università di Pisa, 2004.
- Michele Gori: *Lower semicontinuity and relaxation for integral and supremal functionals*. Università di Pisa, 2004.
- Luca Granieri: *Mass transportation problems and minimal measures*. Università di Pisa, 2005.
- Alessio Brancolini: *Optimization problems for transportation networks*. Scuola Normale Superiore di Pisa, 2006.
- Filippo Santambrogio: *Variational problems in transport theory with mass concentration*. Scuola Normale Superiore di Pisa, 2006.
- Lorenzo Brasco: *Geodesics and PDE methods in transport models*. Università di Pisa, 2010.
- Al-hassem Nayam: *Shape optimization problems of higher codimension*. Università di Pisa, 2011.
- Berardo Ruffini: *Optimization problems for solution of elliptic equations and stability issues*. Scuola Normale Superiore di Pisa, 2013.
- Bozhidar Velichkov: *Existence and regularity results for some shape optimization problems*. Scuola Normale Superiore di Pisa, 2013.
- Xin Yang Lu: *Geometric and regularity properties of solutions of some problems related to the average distance functional*. Scuola Normale Superiore di Pisa, 2013.
- Serena Guarino Lo Bianco: *Some optimization problems in mass transport theory*. Università di Pisa, 2014.
  
- Main speaker in many international conferences and workshops on the fields of calculus of variations, nonlinear partial differential equations, applied mathematics, control theory, and related topics.
  
- Organizer of several meetings (national and international level) on the fields listed above:
  - Workshop on *Semicontinuity and Relaxation*, SISSA Trieste, May 25–29, 1987, (organized with G. Dal Maso)
  - Conference on *Structural Optimization and Control Theory* CISM, Udine, June 16–18, 1988, (organized with E. Cabib)
  - Conference on *New Developments in Partial Differential Equations and Applications to Mathematical Physics*, Ferrara, October 14–18, 1991 (organized with G. P. Galdi and L. Zanghirati)
  - International School on *Differential Equations and Calculus of Variations*, Pisa, September 14–26, 1992 (organized with A. Marino and M. K. V. Murthy)
  - Conference on *Motion by Mean Curvature*, Trento, October 20–24, 1992 (organized with A. Visintin)
  - Conference on *Calculus of Variations, Homogenization, and Continuum Mechanics*, CIRM Marseille-Luminy, June 21–25, 1993 (organized with G. Bouchitté and P. Suquet)
  - Second International School on *Differential Equations and Calculus of Variations*, Pisa, September 16–28, 1996 (organized with A. Marino and M. K. V. Murthy)

- Workshop on *Variational Problems with Free Interfaces*, Pisa, February 20–22, 1997 (organized with G. Bellettini, M. Chipot, J. Sprekels)
- Third International School on *Differential Equations and Calculus of Variations*, Pisa, September 28–October 3, 1998 (organized with P. Marcellini)
- Workshop on *Mass Transport Problems, Shape Optimization and Weak Geometrical Structures*, Pisa, October 26–28, 2000 (organized with L. Ambrosio)
- Spring School on *Calculus of Variations*, Pisa, May 20–25, 2002 (organized with L. Ambrosio)
- International conference on *Optimal Transport Theory and Applications*, Pisa, October 9–12, 2003, (organized with L. Ambrosio and R. McCann)
- Workshop on *Partial Differential Equations, Optimal Design and Numerics*, Benasque (Spain), August 28 – September 9, 2005 (organized with E. Zuazua)
- Workshop on *Optimal Transport: Theory and Applications*, Pisa, November 14–18, 2006 (organized with L. Ambrosio and F. Otto).
- Workshop on *Shape Analysis for Eigenvalues*, Oberwolfach (Germany), April 8 – 14, 2007 (organized with D. Bucur and A. Henrot)
- Workshop on *Partial Differential Equations, Optimal Design and Numerics II*, Benasque (Spain), August 26 – September 7, 2007 (organized with E. Zuazua)
- Workshop on *Variational Analysis and Aerospace Engineering*, Erice, September 8 – 16, 2007 (organized with A. Frediani)
- GNAMPA School on *Optimal transportation, geometry and functional inequalities*, Pisa, October 28 – 31, 2008 (organized with L. Ambrosio, N. Fusco, G. Savaré)
- Workshop on *Optimal transportation and applications*, Pisa, November 3 – 6, 2008 (organized with L. Ambrosio, G. Savaré)
- Workshop on *Partial Differential Equations, Optimal Design and Numerics III*, Benasque (Spain), August 24 – September 4, 2009 (organized with E. Zuazua)
- Workshop on *Variational Analysis and Aerospace Engineering II*, Erice, September 8 – 16, 2010 (organized with A. Frediani)
- Workshop on *Optimal Transport: Theory and Applications*, Pisa, October 12–16, 2010 (organized with L. Ambrosio and G. Savaré)
- Workshop on *Partial Differential Equations, Optimal Design and Numerics IV*, Benasque (Spain), August 29 – September 9, 2011 (organized with E. Zuazua)
- Workshop on *Mass Transportation and Related Fields*, Pisa, November 17, 2011 (organized with L. De Pascale)
- Workshop on *Shape Optimization Problems and Spectral Theory*, CIRM-Luminy (France), May 28 – June 1, 2012 (organized with D. Bucur, A. Henrot, M. Pierre)
- Workshop on *Optimal Transportation and Applications*, Pisa, November 5–9, 2012 (organized with L. Ambrosio and G. Savaré)
- Workshop on *Partial Differential Equations, Optimal Design and Numerics V*, Benasque (Spain), August 25 – September 5, 2013 (organized with E. Zuazua)
- Editor of several international journals as:
  - Journal of Convex Analysis (managing editor),
  - ESAIM: Control, Optimisation and Calculus of Variations (COCV),
  - Journal of Optimization Theory and Applications,
  - Set-Valued and Variational Analysis: Theory and Applications,
  - Revista Matemática Complutense,
  - Applied Mathematics and Optimization,
  - ISRN Mathematical Analysis,
  - Pure and Applied Functional Analysis,
  - International Journal of Pure and Applied Mathematics (IJPAM),
  - International Journal of Differential Equations and Applications (IJDEA),
  - International Journal of Dynamical Systems and Differential Equations (IJDSDE),
  - Communications in Applied Analysis,

- Discrete and Continuous Dynamical Systems (1995–2014),
- Journal of the Egyptian Mathematical Society (1993–2012),
- Annali dell'Università di Ferrara (1987–1990).