CURRICULUM VITÆ

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Name: **Andrea CORLI**

Birth date: 22.8.1958

Nationality: Italian

University and address: Dipartimento di Matematica e Informatica – Università di Ferrara, Via N. Machiavelli 35 – I-44100 Ferrara – Italy

Studies: Degree in Mathematics (Ferrara, 1981, 110/110 cum laude)

Istituto Nazionale di Alta Matematica (1981–82,1982–83)

Ph.D. Program in Mathematics (Bologna, 1983–84, 1984–85, 1985–86, then interrupted for hiring at the University of Ferrara)

Grants: University of Rennes 1 (9.1989-9.1990, CNR)

University of Rennes 1 (9.1990-2.1991, CNR)

University of Nice (1.3.1997–21.3.1997, CNR)

Professional Career: Researcher (Faculty of Sciences, University of Ferrara, 1986)

Confirmed Researcher (Ferrara, 1989)

Associate Professor (Faculty of Sciences, University of Bari, 1998)

Associate Professor (Faculty of Engineering, University of Ferrara, 2001)

Associate Professor (Department of Mathematics, University of Ferrara, 2013)

Full Professor (Department of Mathematics and Computer Science, University of Ferrara, 1.2.2016).

Main topics of research: Traveling waves for degenerate parabolic equations, hyperbolic systems of conservation and balance laws, nonlinear geometric optics, solvability of linear partial differential operators.

Short description of the scientific research

My scientific research concerns mainly partial differential equations and is summarized in the following topics.

Linear differential equations in Gevrey classes. In a first series of papers I studied some properties of solutions to linear partial differential equations in Gevrey classes. The topics include the propagation of singularities of solutions, the analysis of hyperbolic-elliptic equations, the local solvability and hypoellipticity of operators.

Nonlinear geometric optics. In the framework of weakly nonlinear geometric optics I focused on nonlinear hyperbolic systems. In the case of a single space dimension the topics considered are the oscillatory analysis of solutions having a single discontinuity (shocks or contact discontinuities).

Systems of balance laws. My main contributions in this field are about the global existence of solutions to strictly hyperbolic systems of balance laws, in one space dimension. They refer to solutions having large total variation, their stability, uniqueness, existence of semigroups and the analysis of special systems of two conservation laws. Applications have been given to phase transitions, combustion waves, vehicular traffic flows, chromatography, crystal growth, fluid flows with valves, optical beams. In addition to these papers I contributed to the study of stratified solutions for hyperbolic systems in one space dimension, to the analysis of the stability of shock waves for second order systems, in several space dimensions, and finally to the study of singular limits for parabolic-elliptic (or simply parabolic) regularizations of scalar diffusive-dispersive equations.

Traveling-wave solutions to degenerate parabolic equations. In a series of papers I studied the existence, uniqueness, and regularity property of traveling-waves solutions to degenerate parabolic equations, in one space dimension. Applications to vehicular traffic flows and pedestrian dynamics have been considered. Also traveling waves on networks have been studied. The case in which the diffusion becomes negative arise from transport models and has been studied as well.

Miscellanea. These include a study of a diffusion equation with free boundary arising in nanophased thin films, the development of an agent-based model for the spread and persistence of the classical swine fever in wild boar populations, the study of the waterhammer effect in (network of) pipes through multiscale analysis.

Scientific activity

Degree Thesis:

- *Su alcune congetture di E. de Giorgi sui sistemi sovradeterminati di equazioni alle derivate parziali,* (italian) advisor L. Cattabriga; Ferrara, 1981.

Publications in scientific journals:

1. *Un teorema di rappresentazione per certe classi generalizzate di Gevrey,* (italian) Boll. Un. Mat. Ital., Anal. Funz. Appl. (VI)IV-C(1) (1985), 245–257.

2. *Propagation of singularities for operators with constant coefficient hyperbolic-elliptic principal part,* Ann. Mat. Pura Appl. (IV) 147 (1987), 303–341 (with M. Cicognani).

3. *Gevrey solvability for hyperbolic operators with constant multiplicity,* in: L. Cattabriga et al. (ed.): *Recent Developments in Hyperbolic Equations,*Longman 1988, 290–304 (with L. Rodino).

4. *On local solvability in Gevrey classes of linear partial differential operators with multiple characteristics,* Comm. Partial Differential Equations 14 (1989), 1–25.

5. *On local solvability of linear partial differential operators with multiple characteristics,* J. Differential Equations 81 (1989), 275–293.

6. *The problem of local solvability of the linear partial differential equations,* in: Th. Rassias: *Constantin Carathéodory: An international tribute,* World Sci. Publ. Co. 1991, 142–180 (with L. Rodino).

7. *Life span of rapidly oscillating shock waves,* Rend. Sem. Mat. Univ. Pol. Torino. 51 (4) (1993), 397–411.

8. *Weak shock waves for second-order multi-dimensional systems,* Boll. Un. Mat. Ital. (7) 7-B (1993), 493–510.

9. *Weakly nonlinear geometric optics for hyperbolic systems of conservation laws with shock waves,* Asymptotic Anal. 10 (1995), 117–172.

10. *Perturbations à variation bornée d'un choc de grande amplitude,* C. R. Acad Sci. Paris Sér I Math. 321 (1995), 537–540 (with M. Sablé-Tougeron).

11. *Asymptotic analysis of contact discontinuities,* Ann. Mat. Pura Appl. 173(1997), 163–202.

12. *Perturbations of bounded variation of a strong shock wave,* J. Differential Equations 138 (1997), 195–228 (with M. Sablé-Tougeron).

13. *Stability of contact discontinuities under perturbations of bounded variation,* Rend. Sem. Mat. Fis. Univ. Padova 97 (1997), 35–60 (with M. Sablé-Tougeron).

14. *Global existence and continuous dependence in hyperbolic models of phase transitions,* in: G. Iooss, O. Guès, A. Nouri (ed.):*Trends in Applications of Mathematics to Mechanics,* Chapman and Hall/CRC, 2000, 161–171 (with R. M. Colombo).

15. *Noncharacteristic phase boundaries for general systems of conservation laws,* Ital. J. Pure Appl. Math. 6 (1999), 43–62.

16. *Continuous dependence in conservation laws with phase transitions,* SIAM J. Math. Anal. 31 (1999) (1) 34–62 (with R. M. Colombo).

17. *The visco-capillarity kinetic condition for sonic phase transitions,* Ann. Univ. Ferrara, Sez. VII, Sc. Mat., 46 (2000), 181–196.

18. *Subsonic and sonic phase transitions,* Int. J. Differ. Equ. Appl. **1A** (2000), no. 1, 31–39.

19. *Local existence of stratified solution to hyperbolic systems,* Workshop on Partial Differential Equations, Ferrara, 1999. Ann. Univ. Ferrara, Sez. VII, Sc. Mat. Suppl. 45 (1999), 109–119 (with O. Guès).

20. *Kinetic stabilization of a sonic phase boundary,* Arch. Rat. Mech. Anal. 152 (2000), 1–63 (with M. Sablé-Tougeron).

21. *Stratified solutions of systems of conservation laws,* Trans. Amer. Math. Soc. 353 (2001), 2459–2486 (with O. Guès).

22. *Hypoellipticity and local solvability in Gevrey classes,*Math. Nach. 242 (2002), 5–16 (with A. Albanese and L. Rodino).

23. *Sonic phase transitions and Chapman-Jouguet detonations,* J. Differential Equations 184 (2002), 321–347 (with R. M. Colombo).

24. *On 2×2 conservation laws with large data,* NoDEA Nonlinear Differential Equations Appl. 10 (2003), 255–268 (with R. M. Colombo).

25. *Phase transitions and Chapman-Jouguet combustions,* in Thomas Hou, Eitan Tadmor (eds): "Hyperbolic Problems: Theory, Numerics, Applications". Proceedings of the "Ninth International Conference on Hyperbolic Problems", Pasadena, 2002. Springer, 2003, 463–472 (with R. M. Colombo).

26. *Sonic and kinetic phase transitions with applications to Chapman-Jouguet deflagrations,* Math. Meth. Appl. Sci. 27 (2004), 843–864 (with R. M. Colombo).

27. *Stability of the Riemann semigroup with respect to the kinetic condition,* Quart. Appl. Math. 62 (2004), 541–551 (with R. M. Colombo).

28. *A semilinear structure on semigroups in a metric space,* Semigroup Forum 68 (2004), 419–444 (with R. M. Colombo).

29. *The Riemann problem for reversible reactive flows with metastability,* SIAM J. Appl. Math. 65 (2004), 426–457 (with H. Fan).

30. *On a class of hyperbolic balance laws,* J. Hyperbolic Diff. Equations 1 (2004), 725–745 (with R. M. Colombo).

31. *Conservation versus balance laws in traffic flow,* in S. P. Hoogendoorn, S. Luding, P. H. L. Bovy, M. Schreckenberg, D. E. Wolf (eds.): "Traffic and Granular Flow '03". Proceedings of the Conference "Traffic and Granular Flow '03", Delft, 2003. Springer, 2005, 235–240 (with P. Bagnerini, R. M. Colombo and S. Pedretti).

32. *The Riemann problem for a three-phase flow,* Far East J. Appl. Math. 15 (2004), 243–256 (with H. Fan).

33. *Dynamic parameters identification in traffic flow modeling,* Discrete Contin. Dyn. Syst. (2005), suppl., 190–199 (with R. M. Colombo).

34. *On the role of source terms in continuum traffic flow models,* Math. Comp. Model. 44 (2006), 917–930 (with P. Bagnerini and R. M. Colombo).

35. *Well posedness for multilane traffic models,* Ann. Univ. Ferrara Sez. VII (N.S.) 52 (2006), 291–301 (with R. M. Colombo).

36. *On the operator splitting method: nonlinear balance laws and a generalization of Trotter-Kato formulas.* In: M. Padula and L. Zanghirati (eds.): "Hyperbolic problems and regularity questions", Birkhäuser, 2007, 91–100 (with R. M. Colombo).

37. *On source terms in multilane traffic models,* Communications to SIMAI Congress 2 (2007), (with R. M. Colombo).

38. *Non local balance laws in traffic models and crystal growth,* Z. Angew. Mat. Mech. 6 (2007), 449–461 (with R. M. Colombo and M. Rosini).

39. *A hyperbolic model of multiphase flow,* in: S. Benzoni-Gavage and D. Serre (eds.): "Hyperbolic problems: Theory, Numerics, Applications", Springer, 2008, 407–414 (with D. Amadori).

40. *On a model of multiphase flow,* SIAM J. Math. Anal. 40 (1), 2008, 134–166 (with D. Amadori).

41. *On a diffusion problem arising in nanophased thin films,* Adv. Math. Sci. Appl. 18 (2008), 517–533 (with V. Guidi and M. Primicerio).

42. *Global solutions for a hyperbolic model of multiphase flow,* in: E. Tadmor, J.-G. Liu, Th. Tzavaras (eds.): "Hyperbolic problems: Theory, Numerics, Applications", Proc. Sympos. Appl. Math., 67, Part 1, Amer. Math. Soc., 2009, 161–173 (with D. Amadori).

43. *Global existence of BV solutions and relaxation limit for a model of multiphase reactive flow,* Nonlinear Analysis 72 (2010), 2527–2541 (with D. Amadori).

44. *Control of gradient catastrophes developing from dark beams,* Optics Letters 35(24) (2010), 4217–4219. (with S. Malaguti, S. Trillo).

45. *Singular limits for a parabolic-elliptic regularization of scalar conservation laws,* (with Ch. Rohde), Journal Diff. Equations, 253(5) (2012), 1399–1421.

46. *A multiscale approach to liquid flows in pipes,* Appl. Math. Comp., 219 (2012), 856–874 (with I. Gasser, M. Lukáčová-Medviďová, A. Roggensack, U. Teschke).

47. *Global existence of solutions by path decomposition for a model of multiphase flow,* Quart. Appl. Math., 71(1) (2013) 135–182 (with F. Asakura).

48. *A model for fluid flow in porous media with phase-dependent damping,* "Proceedings of the Workshop: Hyperbolic Techniques for Phase Dynamics", Oberwolfach Reports 29 (2013), 1694–1696 (with H. Fan).

49. *Solutions for a hyperbolic model of multi-phase flow,* ESAIM: Proc. Volume 40(2013), 1–15 (with D. Amadori).

50. *Traveling waves of phase transitions in porous media,* Appl. Anal., 92(2013), 1217–1240 (with H. Fan).

51. *Phase transitions for laminar-turbulent flows in a pipeline or through porous media,*Communications in Information and Systems 13(2) (2013), 151–181 (with H. Fan).

52. *A hyperbolic model for phase transition in porous media,* in: F. Ancona, A. Bressan, P. Marcati and A. Marson (eds.): "Hyperbolic problems: Theory, Numerics, Applications", Amer. Inst. Math. Sci., 2014, 475–482 (with H. Fan).

53. *Traveling waves in porous media with phase-dependent damping,* Nonlinear Anal. Real World Appl. 19 (2014), 135–149 (with H. Fan).

54. *Parabolic approximations of diffusive-dispersive equations,* J. Math. Anal. Appl. 414(2)(2014), 773–798 (with Ch. Rohde, V. Schleper).

55. *Wave-front tracking for the equations of nonisentropic gasdynamics,* Ann. Mat. Pura Appl. 194(2) (2015), 581–618 (with F. Asakura).

56. *Global weak solutions for a model of two-phase flow with a single interface,* J. Evol. Equations 15(3) (2015), 699–726 (with D. Amadori, P. Baiti, E. Dal Santo).

57. *Global existence of solutions for a multi-phase flow: a bubble in a liquid tube and related cases,* Acta Math. Sci. Ser. B Engl. Ed. 35(4) (2015), 832–854 (with D. Amadori, P. Baiti, E. Dal Santo).

58. *Global existence of solutions for a multi-phase flow: a drop in a gas-tube,* J. Hyperbolic Diff. Equations 13(2) (2016), 381–415 (with D. Amadori, P. Baiti, E. Dal Santo).

59. *A hyperbolic model of two-phase flow: global solutions for large initial data,* Bull. Braz. Math. Soc. (N.S.) 47(2016), 65–75 (with D. Amadori, P. Baiti, E. Dal Santo).

60. *Laminar-turbulent reactive flows in porous media,* Bull. Braz. Math. Soc. (N.S.) 47(2016), 267–276 (with H. Fan).

61. *The path decomposition technique for systems of hyperbolic conservation laws,* Discrete Cont. Dyn. Systems, Series S, 9(1), (2016), 15–32 (with F. Asakura).

62. *Semi-wavefront solutions in models of collective movements with density-dependent diffusivity,* Dyn. Part. Diff. Eq. 13(4)(2016), 297–331 (with L. Malaguti).

63. *Semi-wavefronts in models of collective movements with density-dependent diffusivity,* "Proceedings of the Workshop: Hyperbolic Techniques in Modelling, Analysis and Numerics", Oberwolfach Reports 30 (2016) (with L. di Ruvo and L. Malaguti).

64. *Traveling waves for degenerate diffusive equations on networks,* Networks Heterogeneous Media 12(3) (2017), 339–370 (with L. di Ruvo, L. Malaguti, M.D. Rosini).

65. *Sharp profiles in models of collective movements,* Nonlinear Diff. Equat. Appl. NoDEA, 24:40 (2017) (with L. di Ruvo, L. Malaguti).

66. *The reflection of an ionized shock wave,* Cont. Mech. Thermodyn. 30 (2018), 365–380 (with F. Asakura).

67. *A mathematical model of ionized gases: thermodynamic properties,* "Workshop on the Boltzmann Equation, Microlocal Analysis and Related Topics", (2018), 173–192 (with F. Asakura).

68. *Coupling conditions for isothermal gas flow and applications to valves,* Nonlinear Analysis Series B: Real World Applications 40 (2018), 403–427 (with M. Figiel, A. Futa, M.D. Rosini).

69. *Two-phase flow in porous media with hysteresis,* J. Differential Equat. 265(4) (2018), 1156–1190 (with H. Fan).

70. *Viscous profiles in models of collective movements with negative diffusivities,* Zeit. Angew. Math. Physik (2019) 70:47 (with L. Malaguti).

71. *The Bénard problem for slightly compressible materials: existence and linear instability,* Mediterr. J. Math. (2019) 16:18 (with A. Passerini).

72. *A system of ionized gas dynamics,* J. Math. Phys. 60, 111507 (2019) (with F. Asakura).

73. *Coherence and chattering of a one-way valve,* Z. Angew. Math. Mech. 99 (2019), no. 6, e201800250, 25 pp. (with M.D. Rosini).

74. *Hysteresis and stop-and-go waves in traffic flows,* Math. Mod. Meth. Appl. Sci. 29 (14) (2019), 2637–2678. (with H. Fan).

75. *Coherence of coupling Riemann solvers for gas flows through flux-maximizing valves,* SIAM J. Appl. Math. (2019) 79(6), 2593–2614 (with M.D. Rosini).

76. *Models of collective movements with negative degenerate diffusivities,* In A. Bressan, M. Lewicka, D. Wang, Y. Zheng (eds.): "Hyperbolic Problems - Theory, Numerics, Applications", Proceedings of the Seventeenth International Conference on Hyperbolic Problems, State College (PA), Springer, 2020, 393–399 (with L. Malaguti).

77. *Uniqueness and nonuniqueness of fronts for degenerate diffusion-convection reaction equations,* Electr. J. Qual. Theory Diff. Equa. (2020) 66, 1–34 (with D. Berti and L. Malaguti).

78. *Saturated fronts in crowds dynamics,* Advanced Nonlinear Studies 21(2) (2021), 303–326 (with J. Campos and L. Malaguti).

79. *Wavefronts in traffic flows and crowds dynamics,* in: M. Cicognani, D. Del Santo, A. Parmeggiani, M. Reissig (eds.): Anomalies in Partial Differential Equations, Springer Indam Series (2021), 167–189 (with L. Malaguti).

80. *Wavefronts for degenerate diffusion-convection reaction equations with sign-changing diffusivity,* Discrete Cont. Dynamical Systems 41 (12), (2021), 6023–6046 (with D. Berti and L. Malaguti).

81. *Diffusion-convection reaction equations with sign-changing diffusivity and bistable reaction term,* Nonlinear Analysis-Real World Applic. 67 (2022), Paper No. 103579, 29 pp. (with D. Berti and L. Malaguti).

82. *Wavefront solutions to reaction-convection equations with Perona-Malik diffusion,* J. Differential Equations 308 (2022), 474–506 (with L. Malaguti and E. Sovrano).

83. *Wavefronts in forward-backward parabolic equations and applications to biased movements,* in U. Kähler, M. Reissig, I. Sabadini, J. Vindas (eds.): Analysis, Applications, and Computations. Proceedings of the 13th ISAAC Conference (Ghent), Birkhäuser, 2021 (with D. Berti and L. Malaguti).

84. *Coherence and flow-maximization of a one-way valve,* ESAIM: Mathematical Modelling and Numerical Analysis (2022), 56(5) (2022), 1715–1739 (with U. Razafison and M.D. Rosini).

85. *String stability in traffic flows,* Appl. Math. Comp. 443 (2023), 127775 (24 pages) (with H. Fan).

86. *Wavefronts for generalized Perona-Malik equations,* accepted to Proceedings of the HYP2022 conference, held in Malaga (Spain) (with L. Malaguti and E. Sovrano).

87. *The role of convection in the existence of wavefronts for biased movements,* Math. Meth. Appl. Sci. (2023) (with D. Berti and L. Malaguti).

Preprints:

1. *Delayed diffusion-convection reaction equations,* in preparation (with D. Berti and L. Malaguti).

2. *Coherence of coupling conditions for the isothermal Euler system,* in preparation (with U. Razafison and M.D. Rosini).

3. *The hysteretic Aw-Rascle-Zhang model,* in preparation (with H. Fan).

Fellowships:

1. Research fellowship: FAO, September–December 2009, Consultant on Epidemic Modeling.

2. Teaching fellowship: Department of Mathematics, University of Hamburg. Course on *Systems of conservation laws*, 30 hours, April–May 2009.

Announcements and Reports in Proceedings of Conferences, without editorial board:

1. *Onde d'urto deboli per sistemi del secondo ordine,* (italian) Proceedings 14th Congress U.M.I., Catania (1991).

2. *Perturbazioni BV di onde d'urto e discontinuità di contatto,* (italian) Proceedings 15th Congress U.M.I., Padova (1995).

3. *A stability criterion for phase boundaries,* Proceedings 3rd Congress S.I.M.A.I., Salice Terme (1996).

Talks in Conferences (as invited speaker):

1. *A condition of stability for systems of hyperbolic conservation laws involving phase boundaries,* "Partial Differential Equations", Ferrara, 1996.

2. *Global existence and continuous dependence of phase transitions in hyperbolic conservation laws,* "STAMM '98 (International Symposium on Trends in Applications of Mathematics to Mechanics)", Nice, 25–28.5.1998.

3. *Solutions to balance laws with unbounded total variation,* "Seminar on systems of conservation laws - Stability of solutions ", Aachen, August 1998.

4. *Global existence with the Glimm scheme of phase boundaries* "Workshop on Phase Transitions", Paris, 1999.

5. *Local existence of stratified solutions to systems of balance laws,* "Workshop on Partial Differential Equations - in memory of L. Cattabriga ", Ferrara, 11–13.10.1999.

6. *The visco-capillarity kinetic condition for sonic phase transitions,* "Navier-Stokes equations and related nonlinear problems", Ferrara, 13–17.9.1999.

7. *Subsonic and sonic phase transitions,* "Tenth International Colloquium on Differential Equations", Plovdiv, 18–23.8.1999.

8. *Sonic phase transitions and Chapman-Jouguet detonations,*"Dynamics of phase transitions and nonclassical waves", Kirchzarten, 7–9.5.2001.

9. *Phase transitions and Chapman-Jouguet combustion waves,* "Workshop on Partial Differential Equations", Ferrara, 6–7.2.2002.

10. *Stability of solutions with respect to kinetic criteria,* "Workshop on kinetic criteria for hyperbolic conservation laws", Cambridge, Isaac Newton Institute, 10–12.2.2003.

11. *The Riemann problem for a three-phase flow,* "Directions in partial differential equations", Ferrara, 6–9.11.2003.

12. *The operator splitting method: nonlinear hyperbolic balance laws and a generalization of Trotter-Kato formulas,* "Partial Differential Equations and Applications", Ferrara, 31.3–3.4.2005.

13. *A dynamical approach to phase transitions,* "Mathematical Modeling in Continuum Mechanics and Structures ", Alghero, 10–14.5.2005.

14. *Global existence results for a model of phase transition with phase mixing,* "Joint International Meeting UMI - DMV ", Perugia, 18–22.6.2007.

15. *Non-local traffic flow models,* "Traffic Flow: a Microscopic and Macroscopic Perspective", Hamburg, 11–12.10.2007.

16. *Hyperbolic phase-mixing flows: a global existence result for large data,* "Mini-Workshop: Hyperbolic aspects of phase transition dynamics", Oberwolfach, 24.2–1.3.2008.

17. *Traveling waves for phase transitions in porous media,* "First Conference on Nonlinear evolutionary partial differential equations theories and applications", Shanghai, Jiao Tong University, 12–17.6.2012.

18. *A model for fluid flow in porous media with phase-dependent damping,* "Workshop: Hyperbolic Techniques for Phase Dynamics", Oberwolfach, 9.5–15.5.2013.

19. *Path decomposition techniques for systems of hyperbolic conservation laws,* "Fluid Dynamics and Electromagnetism: Theory and Numerical Approximation", on the occasion of Paolo Secchi and Alberto Valli 60th birthday, Levico Terme, 3–6.6.2014.

20. *Phase transitions in flows through porous media,* "Free surface and geophysical flows", IRMAR, Rennes, 19–22.1.2015.

21. *Global solutions to a model of two-phase flow with few interfaces,* "Fourth Conference on Nonlinear evolutionary partial differential equations theories and applications", Shanghai, Jiao Tong University, 2–7.6.2015.

22. *Semi-wavefront solutions for equations with degenerate diffusivities modeling collective movements,* "11th Meeting on Nonlinear Hyperbolic PDEs and Applications, On the occasion of the 60th birthday of Alberto Bressan,", SISSA, Trieste, 13–17.6.2016.

23. *Semi-wavefronts for models of collective movements with density-dependent diffusivity,* "Hyperbolic Techniques in Modelling, Analysis and Numerics", Oberwolfach, Germany, 20–24.6.2016.

24. *Semi-wavefronts for models of collective movements,* "x XIII Conference", Milan, Italy, 13–16.9.2016.

25. *Traveling wave solutions in models of collective movements,* "Equadiff", Bratislava, Slovakia, 24–28.7.2017.

26. *Traveling wave for collective movements on networks,* "Discrete and Continuous models in the theory of networks", Bielefeld, Germany, 27.11–1.12.2017.

27. *Viscous profiles in models of collective movements with negative diffusivities,* "Joint Meeting UMI-SIMAI-PTM", Wrocław, Poland, 17.9–20.9.2018.

28. *Nonlinear models in collective movements,* "Anomalies in Partial Differential Equations", Rome, Italy, 9.9–13.9.2019.

29. *Nonlinear wavefronts arising in the modeling of collective movements,* "Recent Advances on Dynamical Equations", Ancona, Italy, 24.10–25.10.2019.

30. *Traveling waves for advection-reaction-diffusion equations with negative diffusivity,* "8th European Congress of Mathematics", Workshop on "Topological Methods in Differential Equations", Portorož, Slovenia, 21.6–25.6.2021.

31. *The influence of convection in the existence of wavefronts for biased movements of mixed populations,* "Conservation Laws & Surroundings", Reggio Emilia, Italy, 8–10.5.2023.

32. *Hysteresis and string stability in traffic flows,* "Maathraffic", Tours, France, 5–8.6.2023.

33. *Biased movements of mixed populations: the influence of convection in the existence of wavefronts,* "14th International ISAAC Congress", Ribeirao Preto, Brasil, 17–21.7.2023.

34. *Modeling and management of fluid flows in pipelines with valves,* "16th SIMAI Congress", Matera, Italy, 28.8–1.9.2023.

Talks in Conferences (as contributed speaker):

1. *La condizione di Kreiss-Lopatinski per una classe di sistemi iperbolici del secondo ordine,* "Partial Differential Equations", Bologna, 1991.

2. *Onde d'urto deboli per sistemi del secondo ordine,* "14th National Congress, Italian Mathematical Union", Catania, 19–25.9.1991.

3. *Discontinuità di contatto rapidamente oscillanti,* "IperPi", Pisa, 1993.

4. *Life span of rapidly oscillating shock waves,* "Partial Differential Equations", Torino, 1993.

5. *Perturbazioni BV di onde d'urto e discontinuità di contatto,* "14th National Congress, Italian Mathematical Union", Padova, 11–16.9.1995.

6. *Esistenza globale di onde d'urto di grande ampiezza,* "IperBo"(Giornate di studio su problemi differenziali iperbolici), Bologna, 1995.

7. *A stability criterion for phase boundaries,* "3rd Congress S.I.M.A.I.", Salice Terme, 27–31.5-1996.

8. *Il semigruppo di Riemann standard per le transizioni di fase,* "IperAq97", L'Aquila, 11–13.11.1997.

9. *Stratified solutions to balance laws,* "Theoretical and numerical aspects of hyperbolic systems ", Heraklion, 1998.

10. *Soluzioni a variazione non limitata di leggi di bilancio,* "IperPv98", Pavia, 1–3. 10.1998.

11. *Transizioni di fase soniche e detonazioni di Chapman-Jouguet,* "IperBs00", Brescia, 30.11–2.12.2000.

12. *Hyperbolic phase transitions and Chapman-Jouguet detonations,* "International Conference on Nonlinear Evolutionary Partial Differential Equations", Huang Shan, 10–15.6.2001.

13. *Ipoellitticità e risolubilità locale in spazi di Gevrey,* "IperCt01", Catania, 22–24. 11.2001.

14. *Phase transitions and Chapman-Jouguet combustions,* "Hyp2002", Pasadena, 25–29.3.2002.

15. *Some recent results on phase transitions,* "Leggi di conservazione iperboliche: recenti risultati e prospettive di ricerca", Bologna, 3–4.6.2003.

16. *A class of hyperbolic systems of balance laws,* "Third meeting on Hyperbolic Conservation Laws: Recent results and research perspectives ", Trieste, 21–22.6.2004.

17. *Existence and stability results for a class of hyperbolic balance laws,* "IperPisa", Pisa, 20–22.10.2004.

18. *Well-posedness in the large for a class of hyperbolic systems of balance laws,* "SIAM Conference on Analysis of Partial Differential Equations", Houston, 6–8.12.2004.

19. *Well-posedness for single and multilane vehicular traffic flow,* "Around Hyperbolic Systems", Ferrara, 15–17.6.2005.

20. *Rigorous results for multilane traffic flows,* "Traffic Flow Modeling and Management", Brescia, 19–20.1.2006.

21. *Source terms in multilane traffic flows,* "VIII SIMAI Conference", Baia Samuele, 22–26.5.2006.

22. *Global existence of solutions for a model of multiphase flow,* "Eleventh International Conference on Hyperbolic Problems - Theory, Numerics, Applications", Lyon, 17–21.7.2006.

23. *Hyperbolic phase-mixing flows: a global existence result for large data,* "Fifth meeting on Hyperbolic Conservation Laws: Recent results and Research perspectives ", SISSA, Trieste, 21–22.6.2007.

24. *Singular limits for a parabolic-elliptic regularization of scalar conservation laws,* "IperMe11 ", Messina, 16–18.2.2011.

25. *A hyperbolic model for phase transitions in porous media,* "Fourteenth International Conference on Hyperbolic Problems - Theory, Numerics, Applications", Padova, 25–29.6.2012.

26. *Parabolic approximations of diffusive-dispersive equations,* "Fifteenth Italian Meeting on Hyperbolic Equations IperMiB2013", Milan, 11–13.9.2013.

27. *Laminar-turbulent reactive flows in porous media,* "Fifteenth International Conference on Hyperbolic Problems - Theory, Numerics, Applications", Rio de Janeiro, 28.7–1.8.2014.

28. *Viscous profiles in models of collective movements with negative diffusivities,* "Seventeenth International Conference on Hyperbolic Problems - Theory, Numerics, Applications", State College, 25.6–29.6.2018.

29. *Wavefront solutions to reaction-convection equations with Perona-Malik diffusion,* "Eighteenth International Conference on Hyperbolic Problems - Theory, Numerics, Applications", Malaga, 20.6–24.6.2022.

Talks, not in Conferences: (since 2009)

1. *Un modello ad automi cellulari per la diffusione di malattie negli animali selvatici,* Dipartimento di Matematica, Università di Brescia, 5.3.2009.

2. *On some hyperbolic models for phase transitions,* Department Mathematik, Hamburg University, 7.5.2009.

3. *Risultati recenti su modelli iperbolici di transizione di fase,* Dipartimento di Matematica, Università di Ferrara, 16.6.2009.

4. *Singular limits for a parabolic-elliptic regularization of scalar conservation laws,* Department of Mathematical and Computing Sciences, Tokyo Institute of Technology, Tokyo, 14.9.2012.

5. *Traveling waves in mezzi porosi,* Dipartimento di Ingegneria e Scienze dell'Informazione e Matematica, Università dell'Aquila, 28.5.2013.

6. *Phase transitions in flows through porous media,* ICM, Warsaw, 3.3.2015.

7. *Traveling waves for collective movements with degenerate diffusivity,* Pennsylvania State University, State College, PA, 12.4.2016.

8. *Traveling waves for collective movements with degenerate diffusivity,* Georgetown University, Washington D.C., 22.4.2016.

9. *Traveling waves for collective movements on a network,* G.S.S.I., L'Aquila, 21.3.2017.

10. *Traveling waves for collective movements on a network,* Università di Padova, 21.2.2018.

11. *Traveling waves vs. hyperbolic and parabolic nonlinear equations,* Politecnico di Milano, 05.5.2020.

12. *Wavefront solutions to reaction-convection equations with Perona-Malik diffusion,* University "La Sapienza", Rome, 02.5.2022.

Posters in Conferences:

1. P. Bagnerini, R. M. Colombo, A. Corli and S. Pedretti: *Conservation versus balance laws in traffic flow,* Delft, "TGF03 - Traffic and granular flow 2003", October 1–3 2003.

Lecture Notes:

1. *Analisi Matematica I,* Ferrara, 2011 (Calculus).
2. *Esercizi di Analisi Matematica I,* Ferrara, 2009 (Exercises of Calculus; with A. Ascanelli).
3. *Analisi Matematica I: Esercitazioni con* MATLAB, Ferrara, 2011 (a MATLAB course on Calculus; with Dario Bernardi, Stefania Malaguti, Chiara Visentin).
4. *Esercizi di Analisi Matematica II,* Ferrara, 2009 (Exercises of Advanced Calculus; with A. Ascanelli).
5. *Appunti di Complementi di Analisi Matematica,* Ferrara, 2011 (Advanced Calculus, Fourier series, Fourier transform, ordinary and partial differential equations).
6. *Esercizi di Complementi di Analisi Matematica,* Ferrara, 2009 (Exercises on advanced calculus, Fourier series, Fourier transform, ordinary and partial differential equations; with A. Ascanelli).
7. *Complementi di Analisi Matematica: Esercitazioni con* MATLAB, Ferrara, 2010 (a MATLAB course on advanced calculus, Fourier series, Fourier transform, ordinary and partial differential equations; with N. Cavallini).
8. *Esercizi di Istituzioni di Analisi Superiore,* Ferrara, 1996 (Exercises on Functional Analysis, L^p and Hilbert spaces, Fourier transform, distributions; with R. Agliardi and M. Cicognani).
9. *Appunti di Biomatematica,* Ferrara, 2018 (Introduction to Biomathematics, chemical reactions and mathematical epidemiology in particular; dynamical systems, stability, modeling).
10. *Appunti di Equazioni alle derivate parziali lineari,* Ferrara, 2016 (The Laplace, heat and wave equations; construction of solutions and related properties).
11. *Appunti di Equazioni alle derivate parziali,* Ferrara, 2016 (The transport equation, integration along characteristics, weak solutions, conservation laws, systems of conservation laws).

Main invitation abroad:

- University of Rennes 1 (March 1992)
- University of Nice (April 1994)
- University of Rennes 1 (15 days, June 1997)
- University of Aachen (15 days, August 1998)

- Chinese Universities (Jiao Tong University and Fudan University, Shanghai; Wuhan University, Wuhan; Tsing Hua University and Peking University, Peking; May 2000)
- Max Planck Institut – Leipzig (June 2000)
- Shanghai Jiao Tong University (15 days, May 2001)
- Isaac Newton Institute for Mathematical Sciences, Cambridge (February 2003)
- Osaka Electro-Communication University (18 days, September 2007)
- Hamburg University (2 months, April-May 2009)
- Osaka Electro-Communication University (15 days, September 2010)
- Osaka Electro-Communication University (15 days, September 2012)
- Pennsylvania State University, State College (18 days, April 2016)
- Lublin University (7 days, January 2017)
- Osaka Electro-Communication University (15 days, February 2017)
- Georgetown University, Washington D.C. (15 days, March 2017)
- Stuttgart University (7 days, April 2017)

Participation to schools and courses:

- "Partial Differential Equations", July 1982; Scuola Normale Superiore, Cortona. Lecturers: L. Cattabriga, M. Tsuji.
- "Harmonic Analysis", July 1983; Scuola Normale Superiore, Cortona. Lecturers: M. Cowling, R. Zimmer.
- "Microlocal Analysis and Applications", 3–11.7.1989; Montecatini Terme. Lecturers: J.M. Bony, G. Grubb, L. Hörmander, H. Komatsu, J. Sjöstrand.
- "Winter School on Transport Equations and Control Theory for Partial Differential Equations", 12–17.1.2004; Bressanone. Lecturers: F. Bouchut, R. Triggiani.
- "Lectures on Transport Equations and Multi-D Hyperbolic Conservation Laws", 17–20.1.2005; Bologna. Lecturers: L. Ambrosio, C. De Lellis, F. Otto.
- "Lectures on Boltzmann equation and fluiddynamic limits", 12–17.6.2006; SISSA, Trieste. Lecturers: L. Saint-Raymond, C. Villani.

Organizer of conferences:

1. Organizer (with Ch. Rohde) of the Minisymposium *Phase Transitions*, at the Annual Scientific Conference of the "Gesellschaft für Angewandte Mathematik und Mechanik", 2003, Abano Terme - Padua.
2. Organizer of the Minisymposium *Mathematicians on the road: Mathematical Models for Traffic Flows*, 9th SIMAI Congress, 15–19.9.2008, Rome.
3. Organizer (with M.D. Rosini) of the Workshop *Interactive Workshop on Hyperbolic Equations*, 10–12.9.2018, Ferrara.

4. Organizer (with C. Marcelli) of the Workshop *Recent Advances on Dynamical Equations*, 24-25.10.2019, Ancona.

Other scientific activities:

1. Local responsible of the european project *Geometrical Optics and Related Topics*, 1994–96. Universities of Bordeaux, Bruxelles, Ferrara, Pisa, Rennes, Torino (coordinator Nicolas Lerner).

2. Member of the scientific committee and of the organizing committee of the Conference *IperFe 2002*, held in Ferrara, 2002.

3. Member of the academic staff for the Ph.D. in Engineering, curriculum Mathematics, University of Ferrara, years 2002–2005. Member of the academic staff for the Ph.D. in Mathematics and Computer Science, University of Ferrara, years 2006–2008.

4. Member of the center "Mathematics for Technology - Math4Tech" University of Ferrara.

5. Representant for the University of Ferrara of UMI (Unione Matematica Italiana, Italian Mathematics Association) commission of mathematics teachers in Engineering Faculties (since October 2007).

6. Contact person for the Department of Mathematics and Computer Science, University of Ferrara, of "Sportello Matematico" (Mathematics Counter), an IAC-CNR project, to foster collaborations between industry and mathematics.

Referee for scientific journals:

1. Applicable Analysis

2. Applied Mathematical Modeling

3. Applied Mathematics Letters

4. Annali dell'Universitá di Ferrara

5. Chaos, Solitons & Fractals

6. Communications in Applied and Industrial Mathematics

7. Communications in Mathematical Sciences

8. Communications in Partial Differential Equations

9. Communication on Pure and Applied Analysis

10. Discrete and Continuous Dynamical Systems

11. Il Nuovo Cimento

12. IMA Journal of Applied Mathematics

13. Interfaces and Free Boundaries

14. International Journal of Mathematics and Mathematical Sciences

15. Journal of Differential Equations

16. Journal of Elasticity
17. Journal of Hyperbolic Differential Equations
18. Mediterranean Journal of Mathematics
19. Networks and Heterogenous Media
20. Nonlinear Analysis Series B: Real World Applications
21. Nonlinear Differential Equations and Applications
22. Nonlinear Dynamics
23. Reports on Mathematical Physics
24. SIAM Journal on Mathematical Analysis
25. Zeitschrift für angewandte Mathematik und Physik

Membership to scientific journals:

1. Associate Editor of *Annali dell'Universita' di Ferrara, Sez. 7, Mathematical Sciences.*

Membership to scientific projects:

1. Participant to the European Project *HCL*, *Hyperbolic Systems of Conservation Laws*, October 1998–September 2000 (coordinator Pierangelo Marcati).
2. Participant to the European Project *HYKE*, *Hyperbolic and Kinetic Equations*, August 2002–July 2004 (coordinator Norbert Mauser).
3. Participant to the italian project *Analysis of hydrodynamical models of vehicular traffic flows*, sponsored by GNAMPA, INDAM, 2003 (coordinator Roberto Natalini).
4. Participant to the italian project *Traffic flows: models and control*, sponsored by GNAMPA, INDAM, 2004 (coordinator Rinaldo Colombo).
5. Participant to the italian project *Nonlinear waves - Applications to compressible and uncompressible fluids and to transport of charged particle*, sponsored by GNAMPA-GNFM-GNCS, INDAM, 2004 (coordinator Roberto Natalini).
6. Participant to the italian project *Nonlinear waves*, sponsored by GNAMPA, INDAM, 2005 (coordinator Corrado Lattanzio).
7. Participant to the PRIN italian project *Fluid dynamics and conservation laws*, 2005, (coordinator Paolo Secchi).
8. Participant to the project *Multifunction nanophasics materials for sensoristics*, 2006 (coordinator Giuliano Martinelli), admitted to second level financing on university (Ferrara) budget.
9. Participant to the PRIN italian project *Nonlinear systems of conservation laws and fluid dynamics*, 2007 (coordinator Stefano Bianchini).
10. Participant to the PRIN italian project *Systems of conservation laws and fluid dynamics: methods and applications*, 2009 (coordinator Stefano Bianchini).

11. Coordinator of the project *Environmental effects of vehicular traffic: mathematical models and simulations*, sponsored by the University of Ferrara, 2010.

12. Participant to the italian project *Nonstandard applications of conservation laws*, sponsored by GNAMPA, INDAM, 2011 (coordinator Graziano Guerra).

13. Participant to the italian project *Mixed and nonlocal problems for balance laws*, sponsored by GNAMPA, INDAM, 2012 (coordinator Mauro Garavello).

14. Participant to the italian project *Conservation laws: theory and applications*, sponsored by GNAMPA, INDAM, 2013 (coordinator R.M. Colombo).

15. Participant to the PRIN italian project *Nonlinear partial differential equations of hyperbolic or dispersive type and transport equations: theoretical aspects and applications*, (2013) (coordinator Stefano Bianchini).

16. Participant to the italian project *Conservation aws in modeling aggregation dynamics*, GNAMPA, INDAM, 2014 (coordinator M. Garavello).

17. Participant to the italian project *Balance Laws in the Modeling of Physical, Biological and Industrial Processes*, sponsored by GNAMPA, INDAM, 2015 (coordinator R.M. Colombo).

18. Participant to the italian project *Balance Laws: Theory and Applications*, GNAMPA, INDAM, 2016 (coordinator M. Garavello).

19. Participant to the italian project *Conservation laws: from theory to technology*, GNAMPA, INDAM, 2017 (coordinator R.M. Colombo).

20. Participant to the italian project *Conservation Laws: Hyperbolic Games, Vehicular Traffic and Fluid-dynamics*, GNAMPA, INDAM, 2018 (coordinator F. Marcellini).

21. Participant to the italian project *Partial differential equations of hyperbolic or nonlocal type and applications*, GNAMPA, INDAM, 2019 (coordinator M.D. Rosini).

22. Participant to the italian project *From the well-posedness to game theory in conservation laws, GNAMPA*, INDAM, 2020 (coordinator R.M. Colombo).

23. Participant to the italian project *Evolution equations: well posedness, control and applications*, GNAMPA, INDAM, 2022 (coordinator E. Rossi).

24. Participant to the italian project *Analytic techniques for biological, fluid dynamics and traffic flows models*, GNAMPA, INDAM, 2023 (coordinator F. Marcellini).

Main scientists invited at the University of Ferrara:

1. Monique Sablé-Tougeron (two weeks, 1995; three weeks 1996);

2. Guy Métivier (two weeks, 1997);

3. Olivier Guès (two weeks, 1998);

4. Sylvie Benzoni-Gavage (two weeks, 1999);

5. Ya-Guang Wang (one month, 2000);

6. Fumioki Asakura (one week, 2001; one week 2002);

7. Haitao Fan (two weeks, 2002);

8. Harumi Hattori (one month, 2004);
9. Fumioki Asakura (two weeks, 2006);
10. Haitao Fan (two weeks, 2009);
11. Fumioki Asakura (two weeks, 2012);
12. Haitao Fan (two weeks, 2012);
13. Hermano Frid (one month, 2014);
14. Haitao Fan (three weeks, 2015).
15. Fumioki Asakura (two weeks, 2016);
16. Haitao Fan (two weeks, 2022);
17. Haitao Fan (two weeks, 2023);

Last academic duties:

1. Member of the *Center for Cooperation to International Development*, University of Ferrara, 2013 to 2018.
2. Member of the Commission *Orienteering students*, University of Ferrara, 2013 to 2018.
3. Member of the Commission *TOLC (Test OnLine Cisia)*, concerning admission tests for studies in Engineering, University of Ferrara, since October 2014.
4. Vice-head of the Department of Mathematics and Computer Science, since November 2015 to today.
5. Head of the Council for Courses in Mathematics, University of Ferrara (*Coordinatore dei Corsi di Studio in Matematica*), since November 2018.
6. Member of an upgrading commission (upgrading to Associate Professor), University of Ferrara, April 2018.
7. Member of a recruitment commission (Associate Professor), University of Modena-Reggio Emilia, October 2018.
8. Member of a recruitment commission (Researcher RTDb), University of Brescia, November 2018.
9. Member of an upgrading commission (upgrading to Full Professor), University of Ferrara, December 2019.
10. Member of a recruitment commission (Researcher RTDb), University of Modena-Reggio Emilia, June 2020.
11. Member of a recruitment commission (Research cheque), University of Modena-Reggio Emilia, October 2019.
12. Member of a recruitment commission (Researcher RTDb), Marche Polytechnical University, September 2021.
13. Member of a recruitment commission (Research cheque), University of Modena-Reggio Emilia, October 2021.

14. Member of an upgrading commission (Associate Professor), University of Modena-Reggio Emilia, April 2023.

15. Member of an upgrading commission (Full Professor), University of Ferrara, April 2024.

Awards:

1. Award winner of a subsidy for teaching and research, ex art. 29/19 Italian Law n. 240/2010.

2. The paper *Global existence of solutions for a multi-phase flow: a drop in a gas-tube*, J. Hyperbolic Diff. Equations 13(2) (2016), 381–415 (with D. Amadori, P. Baiti, E. Dal Santo) has been awarded as one of the best five articles of 2016 in J. Hyperbolic Diff. Equations.

Advisor of Degree Theses:

1. S. Maltoni: *Regolarizzazione di problemi mal posti*, (italian), 1998.

2. E. Grespi: *Aspetti della regolarizzazione in tomografia Compton,* (italian) 1998, coadvisors C. Bonifazzi, G. Maino; graded 110/110. The results of this thesis have been exposed to the SIMAI Congress, 1998.

3. C. Monesi: *La trasformata di Wigner,* (italian), 1998.

4. E. Ganzaroli: *A fully flexible, agent-based model for epidemic spreading in wild animals,* LT in Computer Science, co-advisor G. Zanghirati, 2009; graded 110/110 cum laude. The results of this thesis have been exposed to the Wanpe Congress, 2008.

5. A. Verna: *Introduzione alla teoria del controllo,* (italian), LT in Mathematics, 2011; graded 110/110 cum laude.

6. T. Menardo: *L'Odissea delle scale musicali. Applicazioni della Matematica alla Musica: dai cicli di quinte pitagoriche alla logica fuzzy*, (italian), LM in Mathematics, 2017; graded 110/110 cum laude.

7. I. Benini: *Modelli matematici e parametri identificativi dell'epidemia di COVID-19,* (italian), LT in Mathematics, 2020; graded 110/110 cum laude.

8. S. Locatelli: *Modelli matematici per i comportamenti di gruppo,* (italian), LM in Mathematics, 2021; graded 110/110.

9. O. Santimone: *Modelli di flocking con interazioni locali,* (italian), LT in Mathematics, 2021; graded 100/110.

10. D. Navarri: *Correlazione tra l'eterogeneità nella suscettibilità e la prevalenza di infetti in modelli di diffusione di epidemie,* (italian), LT in Mathematics, 2022; graded 105/110.

11. E. Roversi: *Il metodo della Next Generation Matrix in biomatematica,* (italian), LT in Mathematics, 2022; graded 107/110.

12. B. Vincenzi: *Modelli di facilitazione e competizione in biomatematica,* (italian), LT in Mathematics, 2022; graded 108/110.

13. L. Orlandini: *La biforcazione di Hopf e il modello di Klausmeier,* (italian), LM in Mathematics, 2022; graded 110/110 cum laude.

14. I. Benini: *Optimal stopping problems,* LM in Mathematics, 2022; graded 110/110 cum laude.

15. F. Fiocco: *Traveling waves e loro applicazioni,* (italian), LM in Mathematics, 2021; graded 103/110.

16. F. Martinelli: *A new class of SIR models with internal spacing,* (italian), LM in Mathematics, 2021; graded 110/110 cum laude and dignity of printing.

Member of Ph.D. Commissions:

1. A. Museux, *Propagation d'ondes non-linéaires en présence d'unde viscosité evanescente*, Nice, 2002.

2. R. Folino, *Metastability for hyperbolic variations of Allen-Cahn equation*, L'Aquila, 2017.

3. N. Dymski, *Conservation laws in the modeling of collective phenomena*, Lublin, 2019.

4. K.A. Gyamfi, *Analysis of entropy solutions to conservation laws with discontinuous flux in space and time*, L'Aquila, 2022.

Reporter on Ph.D. Theses:

1. K. Mitra, *Mathematical complexities in porous media flow*, Eindhoven, 2019.

2. G. Stivaletta, *On the follow-the-leader approximation of nonlinear scalar conservation laws and related models*, L'Aquila, 2021.

Other Students:

1. A. Museux (Université Nice); post-doc grant provided by project *HYKE*, October 2002–July 2003.

2. P. Bagnerini; italian *Research Chequer*, January–July 2003 (co-tutoring L. Pareschi).

Teaching

- 1986–87. University of Ferrara:
  - Exercises of Calculus (Mathematics).
- 1987–88. University of Ferrara:
  - Exercises of Calculus (Mathematics),
  - Exercises of Advanced Calculus (Engineering).
- 1988–89. University of Ferrara:
  - Exercises of Calculus (Physics),
  - Exercises of Functional Analysis (Mathematics).
- 1990–91. University of Ferrara:
  - Exercises of Functional Analysis (Mathematics).
- 1991–92. University of Ferrara:
  - Course of Advanced Calculus (Physics),
  - Exercises of Advanced Calculus (Physics),
  - Exercises of Functional Analysis (Mathematics).
- 1992–93. University of Ferrara:
  - Course of Advanced Calculus (Physics),
  - Exercises of Advanced Calculus (Physics),
  - Exercises of Functional Analysis (Mathematics).
- 1993–94. University of Ferrara:
  - Course of Advanced Calculus (Physics),
  - Exercises of Advanced Calculus (Physics).
- 1994–95. University of Ferrara:
  - Course of Advanced Calculus (Physics),
  - Exercises of Advanced Calculus (Physics),
  - Exercises of Functional Analysis (Mathematics).
- 1995–96. University of Ferrara:
  - Course of Calculus (Physics),
  - Exercises of Calculus (Physics),
  - Exercises of Functional Analysis (Mathematics).
- 1996–97. University of Ferrara:
  - Course of Advanced Calculus (Physics),
  - Exercises of Advanced Calculus (Physics)
  - Exercises of Functional Analysis (Mathematics).

- 1997–98. University of Ferrara:
  - Exercises of Calculus (Mathematics),
  - Exercises of Functional Analysis (Mathematics).
- 1998–99. Università of Bari:
  - Course of Calculus (Environmental Sciences),
  - Intensive course of Calculus (Environmental Sciences);

    University of Ferrara:

  - Advanced Calculus (Electronic Engineering).
- 1999–2000. Università of Bari:
  - Course of Calculus (Environmental Sciences);

    University of Ferrara:

  - Course of Advanced Calculus (Electronic Engineering).
- 2000-01. Università of Bari:
  - Course of Advanced Calculus (Environmental Sciences);

    University of Ferrara:

  - Course of Calculus (Mechanical Engineering),
  - Course of Advanced Calculus (Mechanical Engineering).
- 2001-02. University of Ferrara:
  - Course of Calculus (Civil Engineering),
  - Course of Advanced Calculus (Civil Engineering).
  - Course "Hyperbolic systems of conservation laws ", Ph.D. in Mathematics, Ferrara.
- 2002-03. University of Ferrara:
  - Course of Calculus (Civil Engineering),
  - Course of Complements of Advanced Calculus (M.A. in Civil Engineering).
  - Course "Hyperbolic systems of conservation laws ", Ph.D. in Engineering, Ferrara.
- 2003-04. University of Ferrara:
  - Course of Calculus (Civil Engineering),
  - Course of Advanced Calculus (Civil Engineering),
  - Course of Complements of Advanced Calculus (M.A. in Civil Engineering),
  - Course of "Introduction to Young Measures", Ph.D. in Engineering, Ferrara.
- 2004-05. University of Ferrara:
  - Course of Calculus (Civil Engineering),
  - Course of Advanced Calculus (Civil Engineering),

  - Course of Complements of Advanced Calculus (M.A. in Civil Engineering).

- 2005-06. University of Ferrara:
  - Course of Calculus (Civil Engineering),
  - Course of Advanced Calculus (Civil Engineering),
  - Complements of Advanced Calculus (M.A. in Civil Engineering).

- 2006-07. University of Ferrara:
  - Course of Calculus (Civil Engineering),
  - Complements of Advanced Calculus (M.A. in Civil Engineering).

- 2007-08. University of Ferrara:
  - Course of Calculus (Civil Engineering),
  - Complements of Advanced Calculus (M.A. in Civil Engineering).

- 2008-09. University of Ferrara:
  - Course of Calculus (Civil Engineering),
  - Complements of Advanced Calculus (M.A. in Civil Engineering).

    University of Hamburg:

  - Course "Hyperbolic Conservation Laws", April-May 2009.

- 2009-10. University of Ferrara:
  - Course of Calculus (Civil Engineering),
  - Complements of Advanced Calculus (M.A. in Civil Engineering).

- 2010-11. University of Ferrara:
  - Course of Calculus (Civil Engineering),
  - Complements of Advanced Calculus (M.A. in Civil Engineering).

- 2011-12. University of Ferrara:
  - Course of Calculus (Civil Engineering),
  - Complements of Advanced Calculus (M.A. in Civil Engineering).

- 2012-13. University of Ferrara:
  - Course of Calculus (Civil Engineering).

- 2013-14. University of Ferrara:
  - Course of Calculus (Civil Engineering),
  - Course of Linear Partial Differential Equations (Mathematics),
  - Course of "Traveling waves in reaction-diffusion equations and in hyperbolic systems of conservation laws", jointly with Luisa Malaguti, Ph.D. in Mathematics, Universities of Ferrara and Modena Reggio-Emilia.

- 2014-15. University of Ferrara:

  - Course of Calculus (Civil Engineering),
  - Course of Partial Differential Equations (Mathematics),
  - Course of "Traveling waves in reaction-diffusion equations and in hyperbolic systems of conservation laws", jointly with Luisa Malaguti, Ph.D. in Mathematics, Universities of Ferrara and Modena Reggio-Emilia.

- 2015-16. University of Ferrara:
  - Course of Calculus (Civil Engineering),
  - Course of Linear Partial Differential Equations (Mathematics).

- 2016-17. University of Ferrara:
  - Course of Calculus (Civil Engineering),
  - Course of Partial Differential Equations (Mathematics).

- 2017-18. University of Ferrara:
  - Course of Calculus (Civil Engineering),
  - Course of Linear Partial Differential Equations (Mathematics).

- 2018-19. University of Ferrara:
  - Course of Calculus (Civil Engineering),
  - Course of Calculus (Computer Science),
  - Course of Biomathematics (Mathematics).

- 2019-20. University of Ferrara:
  - Course of Calculus (Civil Engineering),
  - Course of Partial Differential Equations (Mathematics).

- 2020-21. University of Ferrara:
  - Course of Calculus (Civil Engineering),
  - Course of Biomathematics (Mathematics).

- 2021-22. University of Ferrara:
  - Course of Calculus (Civil Engineering),
  - Course of Biomathematics (Mathematics).

- 2022-23. University of Ferrara:
  - Course of Calculus (Civil Engineering),
  - Course of Partial Differential Equations (Mathematics).

Other teaching activities:

1. Educational lectures on "Mathematical models for the diffusion of diseases" (with Matlab laboratory) to high-school students during the yearly stage organized at the Department of Mathematics and Computer Science, from 2013 to today.