

## CURRICULUM VITAE ET STUDIORUM



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### EDUCATION

- *Laurea Degree in Mathematics* (4 year course), University of Bologna, March 15, 1991. Thesis in Numerical Analysis titled "A graphic interactive system for statistical analysis of biomedical data" in collaboration with the medical staff of the Gynaecological Department of "S. Orsola" General Hospital, Bologna. (Supervisor: Prof. Ilio Galligani, mark: 110/110 *cum laude*).

- *Summer School* on “Mathematical models and inverse problems” (Prof. Ilio Galligani, University of Bologna, Italy, and Prof. Gunther Uhlmann, University of Seattle, USA), Cortona, Italy, June 30-July 20, 1996.
- *Summer School* on “Numerical Methods for ODEs” (Prof. Kevin Burrage, University of Queensland, Brisbane, Australia and Prof. Ernst Hairer, University of Geneva, Switzerland), Dobbiaco, Italy, July 3-7, 2000.
- *European Summer School in Biomathematics* on “Dynamical Systems in Physiology and Medicine”, Urbino, Italy, July,7-20, 2002
- *Visiting Scholar* at the Advanced Computational Modelling Centre (ACMC), University of Queensland, Brisbane (Australia), August 2-13, 2004.
- *PhD* in Mathematics, August 2008, University of Queensland, Brisbane (Australia), (PhD student from Feb 2005 to Dec 2007, thesis titled “Stochastic Modelling of Biological Processes”, Supervisor: Prof. Kevin Burrage).
- AID (Italian Association for Dyslexia) Conference on “Dyslexia in adults”, Daniel Pennac, May 13, 2014, Modena.
- Residential course on “DSA e Matematica” (10 hours), Bologna , May 30-31, 2014, Association “Oltremodo”.
- Third Erickson Conference on “Insegnare e apprendere la Matematica. QUANDO I CONTI... TORNANO”, Rimini, May 15-16, 2015 (Prof. Daniela Lucangeli, University of Padua)

#### **CURRENT POSITION AND AFFILIATIONS**

- *Assistant Professor*, University of Urbino “C. Bo”, since November 1, 1998.
- Affiliated to GNCS - National Group for Scientific Computing of INdAM (National Institute of Advanced Mathematics).

#### **TEACHING EXPERIENCES**

- 1991-1998: Mathematics and Physics (class A049) in Secondary High Schools in Bologna, Jesi (An), Falconara (An), Novafeltria (formerly Pu, now Rn) and Pesaro.
- 1991 - 1992: member of Committees for High School licence (Esami di Maturità), Casalecchio di Reno (Bo) and Bologna.

- 1993-1998: Teaching Assistant of Mathematics, Probability and Statistics at the University of Urbino "C. Bo".
- 1996-1999: Probabilistic and Statistical methods and Stochastic Processes, Environmental Laurea Degree (5 year program), University of Urbino "C. Bo".
- 2001-2007: Probability and Mathematical Statistics (6 CFU, II year, I semester), Applied Computer Science Laurea degree, University of Urbino "C. Bo".
- 1999- present: Mathematics and (fundamentals of) Statistics (with different denominations, ranging from 8 to 12 CFU; now 8 CFU) at the Biotechnologies Laurea Degree, University of Urbino "C. Bo".

### RESEARCH INTERESTS

- Image reconstruction, enhancement and compression; Imaging in Medicine (1991-1998).
- Numerical determination of instability regions for models with characteristic equations having delay dependent parameters (1999 - 2008).
- Stochastic stability of equilibria in biomathematical models (2002 - 2008)
- Applications of stochastic ordinary and stochastic delay differential equations in the biosciences (2000 - present).
- Stochastic modelling of biological processes (2004 - present)
- Stochastic modelling in the neurosciences (2010 - present)
- Teaching Mathematics to students with learning disorders (DSA students) (2013 – present)

### PUBLICATIONS IN INTERNATIONAL JOURNALS

1. E. Beretta, M. Carletti, F. Solimano, *On the effects of environmental fluctuations in a simple model of bacteria-bacteriophage interaction*, The Canadian Applied Mathematics Quarterly, Vol. 8, No. 4, 2000, 321-366.
2. R. Lupini, M. Carletti, *Periodic solutions of differential-difference equations as plane cycles*, Nonlinear Studies, Vol. 8, No. 3, 2001, 297-317.
3. M. Carletti, *Numerical determination of the instability region for a delay model of phage-bacteria interaction*, Num. Alg., Vol. 28, No. 1-4, 2001, 27-44.
4. M. Carletti, *On the stability properties of a stochastic model for phage-bacteria interaction in open marine environment*, Math. Biosci., Vol.175, No.2, 2002, 117-131.

5. M. Carletti , K. Burrage, P. M. Burrage, *Numerical simulation of stochastic ordinary differential equations in biomathematical modelling*, Math. Comp. Simul. Vol. 64, 2004, 271-277.
6. M. Carletti, *Numerical solution of stochastic differential problems in the biosciences*, J. Comp. Appl. Math., Vol 185/2, 2006, 422-440.
7. M. Carletti, *Numerical simulation of a Campbell-like stochastic ,delay model for bacteriophage infection*, Math. Med. Biol. (an IMA journal), 23, 2006, 297–310.
8. E. Beretta, M. Carletti, D. E. Kirschner, S. Marino, *Stability analysis of a mathematical model of the immune response with delays*, in Mathematics for Life Science and Medicine, Chapter 8, p.177-206, Springer, 2007.
9. M. Carletti, E. Beretta, *Numerical detection of instability regions for delay models with delay dependent parameters*, J. Comp. Appl. Math., 205, 2007, 835-848.
10. M. Carletti, *Mean-square stability of a stochastic model for bacteriophage infection with time delays*, Math. Biosci., 210, 2007, 395-414.
11. T. Tian, K. Burrage, P.M. Burrage, M. Carletti, *Stochastic delay differential equations for genetic regulatory networks*, J. Comp. Appl. Math., 205, 2007, 696-707.
12. M. Carletti, *Stochastic modelling of biological processes*, Lap Lambert Academic Publishing, 2012, ISBN 978 3 659 00045 4 (PhD thesis).
13. M. Carletti, M. Montani, V. Meschini, L. Radici, M. Bianchi, *Stochastic modelling of PTEN regulation in brain tumours. A model for glioblastoma multiforme*, Math. Biosci. Engin., 12(5), 2015, 965-981.
14. M. Carletti, M. Bocconcelli, V. Meschini, *The Role of miRNAs in Downregulation of PTEN for Glioblastoma Multiforme*. JSM Biotechnol Bioeng 3(3): 1058.
15. M. Carletti, V. Meschini, G. Zanghirati *Modelling intrinsic noise in bacteria-bacteriophage interaction models using stochastic simulation algorithms*, preprint.

## TALKS

1. *Numerical integration of a model for a marine bacteriophage infection influenced by stochastic perturbation*, Congress on “Numerical Analysis, Methods and Mathematical Software”, Ferrara, Italy, January 19-21, 2000.
2. *Modelling of a marine bacteriophage infection with latency period under random perturbations*, 16<sup>th</sup> IMACS World Congress on Scientific Computation, Applied Mathematics and Simulation, Lausanne, Switzerland, August 21-25, 2000.

3. *Instability regions in delay models with delay dependent parameters: an application in the biosciences*, Workshop on "Numerical Methods for Evolutionary Problems", Peschici (Fg), Italy, September 17-21, 2001.
4. *Numerical solution of stochastic differential problems: methods and software*, International Workshop on the Technological Aspects of Mathematics (IWTAM), Bari, Italy, December 18-20, 2002.
5. *Analytical and numerical treatment of SDDEs in biomathematical modelling*, Workshop on Stochastic Systems with Delay and Memory, Wittemberg, Germany, February, 2-5, 2004.
6. *Numerical solution of stochastic functional differential equations with distributed delay terms and applications in epidemiology*, Second International Workshop on the Technological Aspects of Mathematics (IWTAM II), Montecatini, Italy, April 2-4, 2004.
7. *Numerical simulation of a stochastic model for bacteriophage infection with time delays*, SciCADE 05, Nagoya, Japan, May, 23-27, 2005.
8. *Stochastic delay differential equations in biomathematical modelling*, Workshop on Innovative Methods for Evolutionary Problems with Memory, Capri, June 19-21, 2006.
9. *Modelling intrinsic noise in biomathematics*, WANPE08, Udine, Italy, December 15-17, 2008.
10. *Stochastic Modelling of Genetic Regulatory Networks*, GNCS2009 Congress, Montecatini, Italy, February 3-5, 2009.

#### **INVITED LECTURES - COURSES**

1. Lecture on *Numerical determination of the instability regions for a special class of delay models: an example in biomathematics*, Department of Mathematics, University of Ferrara, Italy, October 29, 2001.
2. Lecture on *Stability switch criteria for a special class of delay models: applications in biomathematics*, Department of Mathematics, University of Modena and Reggio Emilia, Italy, November 14, 2001.
3. Short course on *"An algorithmic approach to the numerical approximation of stochastic differential equations with applications in the biosciences"* (8 hours) for the School of Graduate Studies in Model-making, Simulation and Multiscale Characterization for Material and Life Sciences, University of Modena and Reggio Emilia, May 2006.
4. Short course on *"Numerical methods for stochastic differential equations"* (4 hours) for the PhD Program in Mathematics and Computer Science, University of Ferrara, October 2006.

5. Lecture "*Stochastic modelling in the biosciences: environmental and demographic noise*" (in Italian), PhD program in Environmental Sciences , University of Urbino, March 31, 2009
6. Lecture on "*Stochastic modelling of Genetic Regulatory Networks. Modelling noise and delay in Biology*" , University of Trento (Italy), April 17, 2015.

#### **ORGANIZATION OF SCHOOLS**

1. First School in Computational Cell Biology – SCCB2005 "*The role of stochasticity in the modelling and simulation of biological processes*", Urbino (Italy), November 7-9, 2005.
2. Second School in Computational Cell Biology – SCCB2006 "*Computational methods in multiscale processes for proteins interactions*", Modena (Italy), September 4-6, 2006.

#### **GRANTS**

- FIRB 2001 (P.I. Prof. Edoardo Beretta, University of Urbino "C. Bo", now retired)
- PRIN 2007 (P.I. Prof. Edoardo Beretta)
- PRIN 2009 (P.I. Prof. Edoardo Beretta)