

## CURRICULUM VITAE ET STUDIORUM

**Alessandra Guglielmi**

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**Name:** Alessandra Guglielmi.

**Birthplace and birthdate:** Isernia (Italy), 22-th August 1967.

Politecnico di Milano, Department of Mathematics  
**Address:** piazza Leonardo da Vinci, 32 - 20133 Milano, Italy  
phone +39 02 23994641

**E-mail:** [alessandra.guglielmi@polimi.it](mailto:alessandra.guglielmi@polimi.it)

**Web page:** <http://www1.mate.polimi.it/~guglielmi/>

**Researcher unique identifier ORCID:** <https://orcid.org/0000-0001-7005-7588>

## EMPLOYMENT

- Jan 2016-Now: Full Professor in Statistics at Politecnico di Milano, Department of Mathematics, Milano (Italy)
- March 2005- Dec 2015: Associate Professor at Politecnico di Milano, Department of Mathematics, Milano (Italy)
- Nov 1996 - Feb 2005: researcher at CNR-IMATI, Milano (Italy)
- Nov 1990 - Oct 1992: actuary (I was working in the Actuarial Division) for RAS, Milano (now Allianz Italia)

## EDUCATION

- July 1997: discussed PhD thesis in Mathematics, entitled “Risultati sulle distribuzioni di medie di un processo di Dirichlet”
- 1992-1996: Completed PhD program in Mathematics, Dept of Mathematics, Università degli Studi di Milano
- Summer Schools in Statistics and Probability and in Mathematics: SMI Perugia 1989, SMI Perugia 1992, Corso Estivo di Statistica e Calcolo delle Probabilità dell'Università Bocconi 1993, SMI Cortona 1995.
- Oct 1985 - July 1990: Gained undergraduate degree in Mathematics from Università degli Studi di Milano, Milan (Italy). This degree was awarded Summa cum Laude (final score 110/110 cum Laude) which is the Italian equivalent of a British first class degree.

## AWARDS RECEIVED

CNR scholarship for undergraduate theses, May 1990 - Oct 1990.

## SCIENTIFIC INTERESTS

- Bayesian Nonparametrics, Biostatistics
- Exchangeability, Random Probability measures, Point processes
- Computational methods such as Markov chain Monte Carlo
- Bayesian statistics and how to apply Bayesian methods to analyse data.

## VISITING POSITIONS

**February 2017, June 2017, April 2016 and July 2015:** Academic visitor, UCL, Department of Statistical Science, London (UK);

**May 2019, August-September 2017, November 2016, August-September 2014:** Academic visitor, Pontificia Universidad de Chile, Departamento de Estadística, Santiago de Chile; academic visits also in November 2012, September 2011 and November 2010.

**April 2016 and May 2008:** Academic visitor, School of Mathematics, Statistics and Actuarial Science, University of Kent, Canterbury (UK);

**January-May 1998 and November 1998:** academic visitor, Institute of Statistics and Decision Science, Duke University, Durham (NC), USA.

## PROFESSIONAL ACTIVITIES

- I have experience of lecturing to undergraduate, postgraduate and PhD students in engineering (Mathematical Eng, Biomedical Eng, Computer Eng, Mechanical Eng). I have experience with e-learning technologies.
- I have a huge experience in supervising undergraduate and postgraduate projects. Since 2009 I have supervised 8 undergraduate student theses (first level in Mathematical Eng) and 24 graduate student theses (second level in Mathematical Eng), plus more other theses co-supervised. Currently I am supervising 8 students from the second level in Mathematical Engineering. The typical graduate thesis duration of my students is 8-12 months.
- I have acted as an internal and external examiner for PhD examinations.
- I have been invited to give seminars in some University Departments.

- I am a member of The International Society for Bayesian Analysis, of Institute of Mathematical Statistics and of the Italian Statistical Society.
- I have been referee for many journals: *Bayesian Analysis*, *Biostatistics*, *Electronic Journal of Statistics*, *International Journal of Approximate Reasoning*, *Journal of Applied Statistics*, *Journal of the American Statistical Association*, *Journal of Quality Technology*, *Statistica Sinica*, *Journal for Modeling in Ophthalmology* (past 3 years).
- I am Officer (Program Chair) of the Bayesian Nonparametrics Section of ISBA (International Society of Bayesian Analysis), 2020-2021;
- Chair of 2019 Mitchell Prize Committee
- ISBA Board member, 2015-2017;
- Officer of the Bayesian Nonparametrics Section of ISBA (International Society of Bayesian Analysis), 2014-2015;
- currently Member of Collegio di Dottorato (PhD council) *Data Science and Computation*, a joint program among Università degli Studi di Bologna, Politecnico di Milano and Fondazione Golinelli;
- from March 2018 I am member of the Transdisciplinary Unit "Promoting diversity and gender equality in education, science and in a society as a whole: a multi-disciplinary approach", a working unit at Politecnico di Milano which brings together and coordinate activities from the theme and involve expertise from across five departments;
- since 2007 I have been member of the School Student-Professor joint committee (currently member of the School of Industrial and Information Engineering Student-Professor joint committee), which monitors the training offer and the quality of the teaching and student services, identifies indicators for evaluating results and draws up proposals for the improvement of Engineering Programmes; I am currently the chair.
- I am a member of further academic committees at Politecnico di Milano.

## Invited talks (2010-2019)

CMStatistics 2019, 14-16 December 2019, London (UK); CMStatistics 2018, 14-16 December 2018, Pisa (Italy); IFSS 2018, Grenoble (FRANCE), Sept 6-7, 2018; ISBA 2018, Edinburgh (UK), June 24-29, 2018; SIS 2018, Palermo (ITALY), June 20-22, 2018, and also invited discussant at the same workshop; "Bayesian Nonparametric Inference: Dependence Structures and their Applications" (17w5060), Oaxaca (MEXICO), Dec 3-8, 2017; BNP 2017, Paris (FRANCE), June 26-30, 2017; First Italian Meeting on Probability and Mathematical Statistics, Torino (ITALY), June 19-22, 2017; SISBAYES 2017, 7-8 February 2017, Roma (Italy) (tutorial talk); CMStatistics 2016, 9-11 December 2016, Seville

(SPAIN); BAYSM 2016, 19-21 June 2016, Florence (ITALY); SIS 2016, 8-10 giugno 2016, Salerno (ITALY); ICATTG 2015, 29-31 October 2015, Milano, Italy; CMStatistics 2014, 6-8 dicembre 2014, Pisa (Italy); SIS 2014, 11-13 June 2014, Cagliari (Italy); CMStatistics 2013, 14-16 December 2013, London, UK; 7th International Workshop on Simulation, 21-25 May 2013, Rimini, ITALY.

**Participation at other recent workshops:** BNP12 (12th Conference on BNP), SIS 2019, ISBA 2016, 10th Conference on BNP 2015, S.Co.2013, 9th Conference on BNP 2013, Bayesian Young Statisticians Meeting 2013, BISP8 2013, Ninth Valencia Meeting 2010, BISP6 2009.

## Organized workshops

- Session at CMStatistics 2019 (London, UK), Session at CMStatistics 2018 (Pisa, Italy), ISBA 2018 (Edinburgh, UK), CMStatistics 2017 (London, UK), ISBA 2016, S.Co.2013, Milano, 2013; S.Co.2009, Milano, 2009, ISBA 2004 (Viña del Mar, Chile);
- “Workshop on Probabilistic Methods in Statistics and Physics”, Pavia, 2006;
- Session “Some issues in nonparametric Bayesian modeling” at *ISBA 2004 World Meeting*, 2004, Viña del Mar (Cile);
- Workshop on Bayesian Nonparametric Statistics, Belgirate (ITALY), 1997.

## PhD STUDENTS

- Inad Nawajah, PhD in *Mathematical Models and Methods in Engineering*, Politecnico di Milano, 15/07/2014, title of the thesis “Bayesian analysis of Home Care longitudinal data”;
- Ilaria Bianchini, PhD in *Mathematical Models and Methods in Engineering*, Politecnico di Milano, 28/02/2018, title of the thesis “Modeling and computational aspects of dependent completely random measures in Bayesian nonparametric statistics”;
- Mario Beraha, PhD “Data Science and Computation”, XXXIV ciclo, Università di Bologna and Politecnico di Milano, currently at his second year of the program (4 years).

## PAPERS in REFERENCED JOURNALS

Tallarita M., De Iorio M., Guglielmi A., Malone-Lee J. (2019). Bayesian Autoregressive Frailty Models for Inference in Recurrent Events. *The International Journal of Biostatistics*, Ahead of Print,

Beraha M., Guglielmi A. (2019). Invited discussion on “Latent nested nonparametric priors” by Camerlenghi F., Dunson D. B., Lijoi A., Prunster I. and Rodríguez A., *Bayesian Analysis*, **14**, 1326–1332

- Bianchini I., Guglielmi A., Quintana F.A. (2019). Determinantal point process mixtures via spectral density approach. *Bayesian Analysis*, Advance Publication, doi: 10.1214/19-BA1150
- Paulon G., De Iorio M., Guglielmi A., Ieva F. (2018). Joint modelling of recurrent events and survival: a Bayesian nonparametric approach. *Biostatistics*, Latest Articles, doi: 10.1093/biostatistics/kxy026, p. 1–14
- A. Guglielmi, F. Ieva, A.M. Paganoni, F. A. Quintana (2018). A semiparametric Bayesian joint model for multiple mixed-type outcomes: an application to acute myocardial infarction. *Advances in Data Analysis and Classification*, 12(2), 399–423
- R. Argiento, I. Bianchini, A. Guglielmi (2016). Posterior sampling from epsilon-approximation of normalized completely random measure mixtures. *Electronic Journal of Statistics*, Accepted for publication, DOI: 10.1214/16-EJS1168
- R. Argiento, A. Guglielmi, E. Lanzarone, I. Nawajah (2016). Bayesian joint modeling of the health profile and demand of home care patients. *IMA Journal of Management Mathematics*, accepted for publication, DOI: 10.1093/imaman/dpw001
- R. Argiento, I. Bianchini, A. Guglielmi (2016). A blocked Gibbs sampler for NGG-mixture models via a priori truncation. *Statistics and Computing*, **26**, 641–661.
- R. Argiento, A. Guglielmi, E. Lanzarone, I. Nawajah (2016). A Bayesian framework for describing and predicting the stochastic demand of home care patients. *Flexible Services and Manufacturing Journal*, **28**, 254–279.
- R. Argiento, A. Guglielmi, C.K. Hsiao, F. Ruggeri, C. Wang (2015). Modelling the association between clusters of SNPs and disease responses. In *Nonparametric Bayesian Inference in Biostatistics*, Eds: P. Müller, M. Mitra, Springer, ISBN 978-3-319-19517-9.
- A. Guglielmi, F. Ieva, A. M. Paganoni, F. Ruggeri, J. Soriano (2014). Semiparametric Bayesian models for clustering and classification in presence of unbalanced in-hospital survival. *Journal of the Royal Statistical Society, C (Applied Statistics)*, **63**, 25–46.
- R. Argiento, A. Cremaschi, A. Guglielmi (2014). A “Density-Based” Algorithm for Cluster Analysis Using Species Sampling Gaussian Mixture Models. *Journal of Computational and Graphical Statistics*, **23**, 1126–1142.
- R. Argiento, A. Guglielmi, A. Pievatolo (2014). Estimation, prediction and interpretation of NGG random effects models. *Statistical Papers*, **55**, 805–826.
- R. Argiento, A. Guglielmi, J. Soriano (2013). A semiparametric Bayesian generalized linear mixed model for the reliability of Kevlar fibres. *Applied Stochastic Models in Business and Industry*, **29**, 410–423.

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- M. A. Di Lucca, A. Guglielmi, P. Müller and F. A. Quintana (2013). A simple class of Bayesian nonparametric autoregression models. *Bayesian Analysis*, **8**, 63–88.
- S. Favaro, A. Guglielmi, S. G. Walker (2012). A class of measure-valued Markov chains and Bayesian nonparametrics. *Bernoulli*, **18**, 1002–1030.
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- F. Giardina, A. Guglielmi, F. A. Quintana, F. Ruggeri (2011). Bayesian first order autoregressive latent variable models for multiple binary sequences. *Statistical Modelling*, **11**, 471–488.
- R. Argiento, A. Guglielmi, A. Pievatolo (2010). Bayesian density estimation and model selection using nonparametric hierarchical mixtures. *Computational Statistics and Data Analysis*, **54**, 816–832.
- R. Argiento, A. Guglielmi, A. Pievatolo (2009). A comparison of nonparametric priors in hierarchical mixture modelling for AFT regression. *Journal of Statistical Planning and Inference*, **139**, 3989–4005.
- I. Epifani, A. Guglielmi, E. Melilli (2009). Moment-based approximations for the law of functionals of Dirichlet processes. *Applied Mathematical Sciences*, Vol. 3, no. 20, 979 - 1004.
- B. Betrò, A. Bodini, A. Guglielmi (2006). Generalized moment theory and Bayesian robustness analysis for hierarchical mixture models. *Annals of the Institute of Statistical Mathematics*, **58**, 721-738.
- I. Epifani, A. Guglielmi, E. Melilli (2006). A stochastic equation for the law of the random Dirichlet variance. *Statistics & Probability Letters*, **76**, 495–502.
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- J. O. Berger, A. Guglielmi (2001). Bayesian and conditional frequentist testing of a parametric model versus nonparametric alternatives. *Journal of the American Statistical Association*, **96**, 174–184.
- A. Guglielmi, E. Melilli (2000). Approximating de Finetti’s measures for partially exchangeable sequences. *Statistics & Probability Letters*, **48**, 309–315.
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- A. Guglielmi (1998). A simple procedure calculating the generalized Stieltjes transform of the mean of a Dirichlet process. *Statistics & Probability Letters*, **38**, 299–303.
- A. Guglielmi, E. Melilli (1998). Non-informative invariant priors yield peculiar marginals. *Communications in Statistics - Theory and Methods*, **27**, 2293–2306.

## CHAPTERS in BOOKS

- A. Guglielmi, G. Guidoboni, A. Harris, I. Sartori and L. Torriani (2019). Statistical methods in medicine: application to the study of glaucoma. In *Mathematical Modeling of Ocular Fluid Dynamics. From Theory to Clinical Applications*, Eds: G. Guidoboni, A. Harris, R Sacco, Springer-Birkhäuser.
- R. Argiento, A. Guglielmi, C.K. Hsiao, F. Ruggeri, C. Wang (2015). Modelling the association between clusters of SNPs and disease responses. In *Nonparametric Bayesian Inference in Biostatistics* Eds: R. Mitra, P. Müller, Springer.
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- B. Betrò, A. Guglielmi (2000). Methods for global prior robustness under generalized moment conditions. In *Robust Bayesian analysis, Lecture Notes in Statistics*, v. 152, Eds: D. Rios Insua, F. Ruggeri, Springer, 273–294.

B. Betrò, A. Guglielmi (1996). Numerical robust Bayesian analysis under generalized moments conditions. In *Bayesian Robustness, IMS Lecture Notes, vol. 29*, Eds: J. Berger, B. Betrò, E. Moreno, L. Pericchi, F. Ruggeri, G. Salinetti, L. Wasserman.

## PROCEEDINGS and TECHNICAL REPORTS

Beraha, M., Guglielmi, A., Quintana, F. A. (2020). The semi-hierarchical Dirichlet Process and its application to clustering homogeneous distributions. arXiv preprint arXiv:2005.10287. *Submitted*

Beraha M., Gualtieri G., Villa E., Vitali R. and Guglielmi A. (2020). Choosing the right tool for the job: a systematic analysis of general purpose MCMC software. In *Book of Short Papers - SIS 2020, Pearson, Eds:*

De Iorio M., Favaro S., Guglielmi A., Ye L. (2019). Bayesian nonparametric temporal dynamic clustering via autoregressive Dirichlet priors. arXiv:1910.10443 *Submitted*

Cadonna A., Cremaschi A., Guglielmi A. (2019). Bayesian modeling for large spatio-temporal data: an application to mobile networks. In *Book of Short Papers SIS 2019, Pearson, Eds: G. Arbia, S. Peluso, A. Pini, G. Rivellini, ISBN: 9788891915108, p. 691-696*

Bissoli G., Principi C., Rinaldi G.M., Beraha M., Guglielmi A. (2019). A Bayesian model for network flow data: an application to BikeMi trips. In *Book of Short Papers SIS 2019, Pearson, Eds: G. Arbia, S. Peluso, A. Pini, G. Rivellini, ISBN: 9788891915108, p. 673-678*

Argiento R., Bianchini I., Guglielmi A., Lanzarone E. (2018). Bayesian nonparametric covariate driven clustering. In *Book of Short Papers SIS 2018, Pearson, Eds: A. Abbruzzo, E. Brentari, D. Piacentino, M. Chiodi, ISBN: 9788891910233, pp 46-55*

V. Nicoletta, E. Lanzarone, A. Guglielmi, V. Belangér, A. Ruiz (2017). A Bayesian models for describing and predicting the stochastic demand of emergency calls. In *Argiento R., Lanzarone E., Antoniano Villalobos I., Mattei A. (eds), Bayesian Statistics in Action. BAYSM 2016. Springer Proceedings in Mathematics & Statistics, vol. 194, Print ISBN: 978-3-319-54083-2), 203-212, [https://doi.org/10.1007/978-3-319-54084-9\\_19](https://doi.org/10.1007/978-3-319-54084-9_19);*

Paulon, G., De Iorio, M., Guglielmi A. (2016). Bayesian autoregressive semiparametric models for gap times of recurrent events. In *SIS 2016, 48-th Scientific Meeting of the Italian Statistical Society, Proceedings*, Eds: Monica Pratesi and Cira Pena, ISBN: 9788861970618

Guidoboni, G., Harris, A., Guglielmi, A., Cassani, S. and Siesky, B. (2016). Ocular perfusion pressure as a surrogate for ocular perfusion: mathematical and statistical methods to interpret clinical data. *Investigative Ophthalmology & Visual Science*, **57**, 2990-2990.



- I. Nawajah, R. Argiento, A. Guglielmi, E. Lanzarone (2014). Joint Prediction of Demand and Care Duration in Home Care Patients: a Bayesian Approach. In *SIS 2014, 47-th Scientific Meeting of the Italian Statistical Society, Proceedings*, Eds: S. Cabras, T. Di Battista and W. Racugno, ISBN: 978-88-8467-874-4.
- R. Argiento, I. Bianchini, A. Guglielmi (2014). A Bayesian nonparametric model for density and cluster estimation: the  $\varepsilon$ -NGG process mixture In *SIS 2014, 47-th Scientific Meeting of the Italian Statistical Society, Proceedings*, Eds: S. Cabras, T. Di Battista and W. Racugno, ISBN: 978-88-8467-874-4.
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- I. Nawajah, R. Argiento, A. Guglielmi, E. Lanzarone (2013). A Bayesian approach for modeling patient's demand and hidden health status: an application to Home Care. *Proceedings of SCo2013 - Complex Data Modeling and Computationally Intensive Statistical Methods for Estimation and Prediction*.
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## TEACHING EXPERIENCE

Since 2005 I have been teaching at least two courses (=15 ECTS) each year to undergraduate and graduate students in Engineering at Politecnico di Milano. The courses I have been teaching are typically undergrad courses in Probability and Statistics in Italian and a grad course in Bayesian Statistics. I have also taught courses/classes to PhD students.

As an example, this academic year, I taught

- Statistics for undergrad students in Biomedical Engineering at the second semester (February-April 2020) in Italian, and in *distance teaching* modality (5 ECTS)
- Bayesian Statistics for graduate students in Mathematical Engineering at the first semester (September-December 2019) in English (10 ECTS)

## TEACHING PHILOSOPHY

Briefly, here I put down some personal ideas on teaching. First of all, my concept of learning is a combination of critical thinking and technical mastery. I would like my students “to learn how to learn”, so that, once they have finished their studies and start their first job, they are able to understand how to learn new abilities to work and adapt in the new context.

My concept of teaching includes encouraging mastery, competency, lifelong learning, and critical thinking, but, above all, I would like to help to form responsible citizens.

My teaching methods is based on knowledge, critical thinking, curiosity and interaction with students. Of course the methods depend on the level and the type of the program the students attend. For instance, for the course in Bayesian Statistics for graduate students that I teach, the evaluation policy consists in testing the students through a written test and a data analysis project. The students, working in teams of three people, choose the topic among a list of possible real world datasets or case studies I make, or provide they own, and make inference using Bayesian tools and software. In some of the project the focus is computational, i.e. the students must design a MCMC algorithm and code it (in C++ or Python), in others the focus is more on modelling. The teams provide presentations of the project, i.e. the state of their work so far, at two intermediate steps, with a final presentation at the end of the semester exam session. The teams may meet the tutor and me for advise and supervision, but I encourage them to take they own “best statistical” decisions by their own. At the end, they are particularly happy for the work done.

In general, teaching evaluations of my modules always have been positive, most of the time over the median of the University. Some of the personal comments I have received this year include: “I have appreciated very much the possibility of independently developing a practical project based on what was learned during the course”, “I truly appreciate the course and in particular the project work”, “I have been taken by the project! I have learned a lot”.