

Silvia Cagnone

CONTACTS

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CURRENT POSITION

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| <i>Full Professor</i> of Statistics Department of Statistical Sciences, University of Bologna | 2023–Current |
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PREVIOUS POSITIONS

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|---|------------------------|
| Associate Professor of Statistics Assistant Professor of Statistics Department of Statistical Sciences, University of Bologna | 2014–2023 2006–2014 |
| Postdoctoral Fellow in Statistics Department of Statistical Sciences, University of Bologna Supervisor: Stefania Mignani | 2003–2006 |

EDUCATION

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| PhD in Statistics Department of Statistics, University of Bologna Supervisor: Stefania Mignani, Cosupervisor: Irimi Moustaki | 2003 |
| Degree in Statistics (curriculum Economic Statistics) Faculty of Statistical Sciences, University of Bologna Supervisor: Gian Luca Marzocchi | 1999 |

VISITING POSITIONS

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|---|------|
| Visiting Fellow Statistics Department, Athens University of Economics and Business, Athens | 2006 |
| Visiting Fellow Statistics Department, Athens University of Economics and Business, Athens | 2005 |
| Visiting Scholar Statistics Department, London School of Economics and Political Science, London | 2001 |

INSTITUTIONAL DUTIES

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| Program Director of First Cycle Degree in Statistical Sciences Department of Statistical Sciences, University of Bologna. | 2021–Current |
| Responsible of the Statistics Seminars Department of Statistical Sciences, University of Bologna. | 2020–Current |
| Delegate of the International Relations Department of Statistical Sciences, University of Bologna. | 2018–2021 |
| Deputy Director of the Ph.D. Programme in Statistics Department of Statistical Sciences, University of Bologna. | 2017–2021 |
| Member of the Board of the Ph.D. Programme in Statistics Department of Statistical Sciences, University of Bologna. | 2013–2022 |

SCHOLARSHIPS AND AWARDS

- Ambassador of the city of Bologna for Scientific merits 2022
- Beneficiary of the Fund for Research-Based Activities (FFABR) assigned by the National Evaluation Agency of the University system and the Research (ANVUR), 2017
- Marco Polo Scholarship for a period of visiting research at the Athens University of Economics and Business, Athens 2005

MEMBERSHIP OF SCIENTIFIC SOCIETIES

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| Psychometric Society | 2010-Current |
| Classification and Data Analysis Group | 2009-Current |
| ERCIM Working Group | 2005-Current |
| Computing and Statistics: Latent Variable and Structural Equation Models | |
| Italian Statistical Society | 2004- Current |

RESEARCH PROJECTS

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| FIRB Project 2012 “Mixture and latent variable models for causal inference and analysis of socioeconomic data” National Coordinator: Francesco Bartolucci Local Coordinator: Silvia Cagnone | 2012-2016 |
| GRADUA project “Advancement and Development of University capacities in Albania” UNIBO Team Leader: Cinzia Viroli | 2017-2020 |
| Seventh Framework Programme Project EATWELL “Interventions to promote healthy eating habits: evaluation and recommendations” UNIBO Team Leader: Mario Mazzocchi | 2011-2012 |
| PRIN 2008 Project “Latent structure analysis: new boundaries in statistical methods and models” National and Local Coordinator: Paola Monari | |

PRIN 2006 Project

“Statistical methods and models for the evaluation of the formative processes”

National and Local coordinator: Paola Monari

RESEARCH ACTIVITY

My topics of research are latent variable models for categorical and longitudinal data, estimation problems in latent variable models, multilevel models for repeated cross-sectional data, goodness of fit in latent variable models for categorical data, applications of latent variable models to educational, social and health sciences

REVIEWER ACTIVITY

Journals

Annals of Applied Statistics, Applied Psychological Measurement, Advances in Data analysis and Classification, Australian and New Zealand Journal of Statistics, Biometrical Journal, British Journal of Mathematical and Statistical Psychology, Communication in Statistics-Theory and Methods, Communication in Statistics-Simulation and Computation, Computational Statistics and Data Analysis, Food Quality and Preference, Journal of Graphical and Computational Statistics, Journal of Multivariate Analysis, Journal of the Royal Statistical Society, series A, Journal of Applied Statistics, Journal of Educational and Behavioral Statistics, Journal of Computational Economics and Econometrics, Journal of Statistical Software, Metron, Plos One, Psychometrika, Quaderni di Statistica, Quality and Quantity, Structural Equation Modelling, Statistical Methods and Applications, Statistical Methods in Medical Research, Social Indicators, Statistics and Computing, Statistica, Statistica applicata.

Research projects

Reviewer of a project for the Swiss Science Foundation Project funding in Mathematics, Natural sciences, and Engineering (division II) (2021).

Reviewer of a project for the National Science Foundation (Social and Economic Sciences division, Methodology, Measurement and Statistics) (2017).

Reviewer panel member of the VQR 2015-2019.

Reviewer panel member of the VQR 2011-2014.

INVITED TALKS AND SEMINARS

1. Bianconcini S., Cagnone S. *Estimation issues in multivariate panel data*, invited seminar, University of Perugia, Perugia, 26 Ottobre 2023.
2. Bianconcini S., Cagnone S., *Estimation issues in multivariate panel data*, CLADAG 2023, Salerno, 11-13 settembre 2023.
3. Bianconcini S., Cagnone S. *Approximate likelihood estimation of dynamic latent variable models for count data*, 24th International Conference on Computational Statistics (COMPSTAT 2022) Bologna, 23-26 Agosto 2022.
4. Bianconcini S., Cagnone S., *Comparison between different estimation methods in dynamic latent variable models for categorical data*, IMPS 2021, on-line conference, 20-23 Luglio 2021.
5. Bianconcini S., Cagnone S., *Comparison between different likelihood-based estimation methods in latent variable models for categorical data*, SIS 2021, on-line conference, 21-25 Giugno 2021.
6. Bianconcini S., Cagnone S., *Comparison between likelihood based methods of factor models for ordinal data* 12th International Conference of the ERCIM WG on Computational and Methodological Statistics (ERCIM 2019), London, 16-18 Dicembre 2019.

7. Cagnone S., Viroli C., The analysis of longitudinal mixed data via multivariate latent variable models: an application to alcohol use disorder. 11th International Conference of the ERCIMWG on Computational and Methodological Statistics (ERCIM2018), Pisa, 14-16 December 2018.
8. Cagnone S., Moustaki I., *Estimation methods for latent variable models for categorical data*, Workshop Challenges for Categorical Data Analysis 2018, Aachen, 22-23 October 2018.
9. Bianconcini S., Cagnone S., *Generalized linear latent variable models for the analysis of cognitive functioning over time*, 10th International Conference of the ERCIM WG on Computational and Methodological Statistics (ERCIM 2017), London, 16-18 December 2017.
10. Cagnone S., Viroli C., *A multivariate latent variable model for the analysis of health status over time*, 8th International Conference of the ERCIM WG on Computational and Methodological Statistics (ERCIM 2015), London, 12-14 December 2015.
11. Cagnone S., Viroli C., *A multivariate latent variable model for analysing longitudinal mixed data*, IMPS 2015, Beijing, 12-16 July 2015.
12. Cagnone S., Bartolucci F., *Continuous versus discrete latent structures in dynamic latent variable models* SIS 2014, Cagliari, 11-13 June 2014.
13. Cagnone S., Viroli C., *The analysis of heterogeneity and cognitive structure of dementia by means of a factor mixture model*, PLS 2014, 8th International Conference on Partial Least Squares and Related Methods, Paris, 26-28 May 2014.
14. Bartolucci F., Cagnone S., *An adaptive Gauss-Hermite quadrature method for likelihood evaluation of latent autoregressive models for panel data and time-series*, McMSki 2014, Chamonix, 6-9 January 2014
15. Cagnone S., Bartolucci F., *Adaptive quadrature for likelihood inference in dynamic latent variable models*, Sco 2013, Milan, 9-11 September 2013.
16. Bartolucci F., Cagnone S., *Adaptive quadrature for likelihood inference in dynamic latent variable models*, Seventh International Workshop on Simulation, Rimini, 21-25 May 2013.
17. Cagnone S., Bianconcini S., *Approximate likelihood inference via dimension reduction for multidimensional longitudinal data*, invited seminar, Dipartimento di Scienze Economiche e Statistiche, Università degli studi di Udine, 9 May 2013.
18. Bianconcini S., Cagnone S., Rizopoulos D., *A Dimension Reduction Method for Approximating Integrals in Latent Variable Models for Binary Data*, 47th Scientific meeting of the Italian Statistical Society, Rome, 19-21 June 2012.
19. Cagnone S., Bianconcini S., *Approximate maximum likelihood inference in latent variable models for ordinal data*, invited seminar, Facoltà di Scienze Politiche, Università Federico II, Napoli, 23 May 2011.
20. Vasdekis V., Cagnone S., Moustaki I., *A comparison of a pseudo-likelihood estimation and full information maximum likelihood estimation for fitting multivariate longitudinal ordinal data*, 45th Scientific meeting of the Italian Statistical Society, Padova, 16-18 June 2010.
21. Cagnone S., Monari P., *Latent variable models for ordinal data by using different integration methods*, Sixth International Workshop on Simulation, San Petersburg, 28 June-4 July 2009.
22. Cagnone S., Mignani S., Monari P., *Student performance classification based on latent variable models for binary data*, 31st Annual Conference of the German Classification Society on Data Analysis, Machine Learning, and Applications, Friburg, 7-9 March 2007.
23. Cagnone S., Mignani S., *The goodness of fit problem in generalized latent variable for ordinal data*, 13th International Meeting and 68th Annual American Meeting of the Psychometric Society, Cagliari, 7-10 July 2003.

Scientific journals

1. Bianconcini S., Cagnone S., (2023), The dimension-wise quadrature estimation of dynamic latent variable models for count data *Computational Statistics and Data Analysis*, vol 177, 1-7.
2. Reiser M., Cagnone S., Zhu J. (2023), An Extended GFFit Statistic Defined on Orthogonal Components of Pearson's Chi-Square *Psychometrika*, vol 88, 208-240.
3. Guastadisegni L., Cagnone S. Moustaki I. Vasdekis V. (2022) Use of the Lagrange multiplier test for assessing measurement invariance under model misspecification, *Educational and Psychological Measurement*, vol 82(2), 254-280.
4. Bianconcini S., Cagnone S., (2021) Dynamic latent variable models for the analysis of cognitive abilities in the elderly population, *Statistics in Medicine*, 40 (20), 4410-4429.
5. Cagnone S., Viroli C. (2018) Multivariate latent variable transition models of longitudinal mixed data: an analysis on alcohol use disorder, *Journal of the Royal Statistical Society, Series C*, vol 67(5),1399-1418.
6. Bianconcini S., Cagnone S., Rizopoulos D. (2017) Approximate likelihood inference in generalized linear latent variable models based on the dimension-wise quadrature, *Electronic Journal of Statistics*, vol 11 (2), 4404-4423.
7. Cagnone S., Giannerini S., Modugno L. (2017) Multilevel models with stochastic volatility for repeated cross-sections: an application to tribal art prices, *The Annals of Applied Statistics*, vol 11 (2), 1040-1062.
8. Cagnone S., Bartolucci F. (2017) Adaptive quadrature for maximum likelihood estimation of a class of dynamic latent variable models, *Computational Economics*, vol 49 (4), 599-622.
9. Modugno L., Cagnone S., Giannerini S. (2015) A Multilevel model with autoregressive components for the analysis of tribal art prices, *Journal of Applied Statistics*, vol 42, 2141-2158.
10. Mazzocchi M., Cagnone S., Bech-Larsen T., Niedzwiedzka B., Saba A., Shankar B., Verbeke W., Traill W.B.(2015) What is the public appetite for healthy eating policies? Evidence from a cross-European survey, *Health Economics, Policy and Law*, vol 10, 267-292.
11. Bianconcini S., Cagnone S. (2014) The role of posterior density functions in latent variable models for ordinal data, *Communication in Statistics. Theory and Methods*, vol 43, 681-692.
12. Cagnone S., Viroli C. (2014) A factor mixture model for analyzing heterogeneity and cognitive structure of dementia, *AStA Advances in Statistical Analysis*, vol 98, 1-20.
13. Bernini C., Cagnone S. (2014) Analysing tourist satisfaction at a mature and multi-product destination, *Current Issues in Tourism*, vol 17, 1-20.
14. Cagnone S., Monari P. (2013) Latent variable models for ordinal data by using the adaptive quadrature approximation, *Computational Statistics*, vol 28, 597-619.
15. Cagnone S. (2012) A note on goodness of fit test in latent variable models with categorical variables, *Communication in Statistics. Theory and Methods*, vol 41, 2983-2990.
16. Bianconcini S., Cagnone S. (2012) Estimation of generalized linear latent variable models via fully exponential Laplace approximation, *Journal of Multivariate Analysis*, vol 112, 183-193.
17. Bianconcini S., Cagnone, S. (2012) Multivariate latent growth models for mixed data with covariate effects, *Communication in Statistics. Theory and Methods*, vol 41, 3079-3093.
18. Vasdekis, V., Cagnone, S., Moustaki, I. (2012) A composite likelihood inference in latent variable models for ordinal longitudinal responses, *Psychometrika*, vol 77, 425-441.
19. Cagnone S., Viroli C. (2012) A factor mixture analysis model for multivariate binary data, *Statistical Modelling*, vol 12, 257-277.

20. Bianconcini S., Cagnone S. (2012) A general multivariate latent growth model with applications to student achievement, *Journal of Educational and Behavioral Statistics*, vol 37, 339-364.
21. Cagnone S., Moustaki I., Vasdekis V. (2009) Latent variable models for multivariate longitudinal ordinal responses, *British Journal of Mathematical and Statistical Psychology*, vol 62, 401-415.
22. Mignani S., Cagnone S. (2008) University formative process: quality of teaching versus performance indicators, *Quaderni di Statistica*, vol 10, 191-203.
23. Cagnone S., Mignani S. (2007) Assessing the goodness of fit of a latent variable model for ordinal data, *Metron*, vol LXV, 337-361.
24. Bianconcini S., Cagnone S., Mignani S., Monari P. (2007) A latent curve analysis of unobserved heterogeneity in University student achievements, *Statistica*, vol 1, 40-56.
25. Bernini C., Cagnone S. (2007). Multigroup-multiwaves Lisrel modeling in tourist satisfaction analysis, *Statistica*, vol 3, 301-323.
26. Mignani S., Monari P., Bianconcini S., Cagnone S. (2007) La riuscita del percorso universitario: un'analisi longitudinale sugli studenti dell'Ateneo di Bologna, *Rivista di economia e Statistica del territorio*, vol 3, 1-13.
27. Cagnone S., Ricci R. (2005) Student Ability Assessment based on two IRT Models, *Metodoloski Zvezki*, vol 2 (2), 209-218.
28. Cagnone S., Cavrini G., Mignani S. (2004), Confronto tra modelli a variabili latenti per la valutazione della qualità percepita dagli utenti di servizi sanitario ospedalieri *Statistica*, vol LXIV, 630-645.
29. Mignani S., Cagnone S. (2004) A comparison among different solutions for assessing the goodness of fit of a generalized linear latent variable model for ordinal data, *Statistica Applicata*, vol 16, 125-137.

Chapters in books and proceedings

1. Guastadisegni L., Cagnone S., Moustaki I., Vadeskis I (2023) Detecting latent variable nonnormality through the generalized Hausman test, in "Quantitative Psychology", a cura di Wiberg M; Molenaar D.; González J.; Bockenhölt U.; Kim J.S., Springer Proceedings in Mathematics and Statistic, forthcoming.
2. Bianconcini S., Cagnone S. (2021) Comparison between different estimation methods of factor models for longitudinal ordinal data, in "Quantitative Psychology", a cura di Wiberg M; Molenaar D.; González J.; Bockenhölt U.; Kim J.S., Springer Proceedings in Mathematics and Statistics, 9-21.
3. Guastadisegni L., Cagnone S., Moustaki I., Vadeskis I (2021) The asymptotic power of the Lagrange Multiplier tests for misspecified IRT models, in "Quantitative Psychology", a cura di Wiberg M; Molenaar D.; González J.; Bockenhölt U.; Kim J.S., Springer Proceedings in Mathematics and Statistics, 275-284.
4. Bianconcini S., Cagnone S. (2021) Comparison between different likelihood based estimation methods in latent variable models for categorical data, in: Perna C., Salvati N., Schirripa Spagnolo N., Book of Short Papers SIS 2021, Pearson, 151-156.
5. Zhu J., Reiser M., Dassanayake M., Cagnone S. (2016) A power study of the GFFit statistic as a Lack-of-fit Diagnostic for sparse two-way subtables. In: 2016 JSM proceedings: papers presented at the Joint Statistical Meetings, Alexandria, Virginia: American Statistical Association, 2401-2410.
6. Zhu J., Reiser M., Cagnone S. (2015) A power study of the GFFit statistic as a lack-of-fit diagnostic. In: American Statistical Association. 2015 JSM proceedings: papers presented at the Joint Statistical Meetings, Alexandria, Virginia: American Statistical Association, 3887-3899.
7. Modugno L., Cagnone S., Giannerini S. (2014) A multilevel model for repeated cross-sectional data with stochastic volatility. In: Proceedings of 47th Scientific Meeting of the Italian Statistical Society, Cuec editore, 1-6.

8. Reiser M., Cagnone S., Zhu J. (2014) An extended GFit statistic defined on orthogonal components of Pearson's Chi-Square. In: SM Proceedings, StaBiometrics Section. Alexandria, VA: American Statistical Association, Alexandria, Virginia: American Statistical Association, 3644-3657.
9. Cagnone S., Bartolucci F. (2014) Continuous versus discrete latent structures in dynamic latent variable models. In: Proceedings of the 47th Scientific Meeting of the Italian Statistical Society, CUEC editore, 1-10.
10. Cagnone S., Bartolucci F. (2013) Adaptive quadrature for likelihood inference in dynamic latent variable models. In: Proceedings of Complex Data Modeling and Computationally intensive Statistical Methods for Estimation and Prediction, 1-5.
11. Bianconcini S., Cagnone S., Rizopoulos D. (2012) A dimension reduction method for approximating integrals in latent variable models for binary data. In: Proceedings of the XLVI Scientific Meeting, Padova: Cleup, 1-4.
12. Bianconcini S., Cagnone S., Rizopoulos D. (2012) Approximate likelihood inference in latent variable models for categorical data. Quaderni di statistica, vol 14, 45-49.
13. Modugno L., Giannerini S., Cagnone S. (2012) A multilevel model with time series components for the analysis of tribal art prices. Quaderni di statistica, vol 14, 169-172.
14. Vasdekis V., Cagnone S., Moustaki I. (2010) A comparison of a pseudo-likelihood estimation and full information maximum likelihood estimation for fitting multivariate longitudinal ordinal data. In: Proceedings of 45th Scientific meeting of the Italian Statistical Society. Padova: Cleup, 225-336.
15. Bianconcini S., Cagnone S. (2010) A Multilevel latent variable model for multidimensional longitudinal data, in *Data Analysis and Classification: from the exploratory to the confirmatory approach*, a cura di C. Lauro, F. Palumbo, M. Greenacre, Berlin, Springer Verlag, 329-336.
16. Bianconcini S., Cagnone S., Monari P. (2010) Covariate effects in multivariate latent growth models for the analysis of undergraduated student performances. In: Joint meeting GfKI-CLADAG 2010, Book of abstracts, 337-339.
17. Cagnone S., Mignani S., Moustaki I. (2009) Latent variable models for ordinal data in *Statistical Methods for the Evaluation of Educational Services and Quality of Products* a cura di Monari P., Piccolo D., Salmaso L., Bini M., Springer Verlag, Berlin-Heidelberg, 17-28.
18. Cagnone S., Monari P. (2009). Latent variable models for the University process evaluation by using different integration methods. In: Proceedings of the 6th St. Petersburg Workshop on simulation. vol. 1, St. Petersburg: Ermakov S.M, Melas V.B, Pepelyshev A. N. editors, 511-516.
19. Bianconcini S., Cagnone S. (2008) Multivariate latent growth models for continuous repeated measures. In: Book of short papers, SFC-CLADAG 2008, Napoli:Edizioni Scientifiche Italiane, 181-184.
20. Bernini C., Cagnone S. (2008) Convention attendee satisfaction toward the tourism local system: evidence from Rimini. In: *Turismo e turismo tra politica ed innovazione*. Bologna: Patron editore, 159-174.
21. Bianconcini S., Cagnone S., Mignani S., Monari P. (2007) A latent curve analysis for evaluating student achievement in the University of Bologna. In: Proceedings of the 56th session of the ISI, Lisbon, 1-4.
22. Bianconcini S., Cagnone S. (2007) A multilevel latent variable model for multidimensional and longitudinal data. In: Book of short papers, Cladag 2007, IEUM - Edizioni, 483-486.
23. Bianconcini S., Cagnone S., Mignani S., Monari P. (2007) Student mobility and academic achievement: a temporal analysis for Bologna University. Atti della Riunione Scientifica Valutazione e Customer Satisfaction per la Qualità dei Servizi, Roma, 39-42.
24. Mignani S., Monari P., Cagnone S., Ricci R. (2006) Multidimensional versus unidimensional models for ability testing. In: *Data analysis, classification and forward search*, a cura di Zani A., Cerioli M., Riani M., Vichi M., Heidelberg, Springer-Verlag, 339-346.
25. Cagnone S., Mignani S., Ricci R., Casadei G., Riccucci S. (2005). Computer-automated testing: an evaluation of undergraduate student performance. Atti della riunione scientifica Technology Enhanced Learning. New York: Springer, 59-68.

26. Monari P., Mignani S., Cagnone S., Ricci R. (2005) Multidimensional versus unidimensional Model for Ability Evaluation. In: Classification and data Analysis- Book of short papers, Parma: Monte Università Parma, 133-136.
27. Cagnone S., Mignani S., Ricci R., Casadei G., Riccucci S., (2004) Computer-Automated Testing: an evaluation of undergraduate student performance, proceedings of *Technology Enhanced Learning*, Springer, 59-68.
28. Mignani S., Cagnone S., Casadei G., Carbonaro A., (2004) An item response theory model for students ability evaluation using computer-automated test results, in *Studies in Classification, Data Analysis and Knowledge organization*, a cura di Vichi, Monari, Mignani, Montanari, Springer-Verlag, 325-332.
29. Cagnone S., Casadei G., Mignani S., Ricci R., Riccucci S. (2004) Computer-based testing: modelli statistici per la valutazione automatica delle competenze degli studenti universitari. In: E-learning: qualità didattica e knowledge management, Ferrara: Omnicom Editore, 961-970.
30. Cagnone S., Gardini A., Mignani S. (2004) New developments of latent variable models with ordinal data. In: Atti della XLII Riunione Scientifica della Società Italiana di Statistica. Padova: Cleup, 221-232.
31. Brasini S., Cagnone S., Tassinari G., Lombardo A., Molteni L. (2002) Valutazioni e modelli statistici di customer satisfaction e fedeltà del cliente: linee guida d'insieme. Atti della riunione satellite della XLI Riunione Scientifica della SIS, Padova: Cleup, 27-47.

Technical reports and others

1. Cagnone S. (2005) Appunti sulla metodologia Lisrel: aspetti teorici e applicativi, Strumenti per la didattica 2005/3, Dipartimento di Scienze Statistiche, Università di Bologna, 1-59.
2. Cagnone S., Lubisco A., Mignani S. (2003) Modelli a variabili latenti per l'analisi della customer satisfaction degli utenti dei servizi di trasporto pubblico. Quaderni di Dipartimento di Scienze Statistiche, Università di Bologna, serie Appunti e Ricerche 2/2003, Modena, Guaraldi, 1-19.
3. Cagnone S. (2003) Latent variable models for ordinal variables, tesi di dottorato, Dipartimento di Scienze Statistiche, Università di Bologna, 1-144.

TEACHING

- **Undergraduate courses**

- Inference
- Statistics
- Statistics II
- Biostatistics
- Laboratory in R

- **Postgraduate courses**

- Latent variable models
- Statistics for high dimensional data
- Statistics-Advanced Course
- Health Statistics
- Data Analysis
- Evaluation Models

- **Ph.D. courses**

- Structural equation models
- Generalized linear latent variable models
- Readings in Composite likelihoods