## Talk 10: Vlad Stefan Barbu (University of Rouen-Normandy, France and Centre for Demographic Research "Vladimir Trebici", "Costin C. Kiritescu" National Institute of Economic Research of Romanian Academy, Romania)

Title: Semi-Markov processes: nonparametric kernel estimation and associated reliability/survival analysis modelling and estimation

Abstract. Our presentation is dedicated to the estimation of semi-Markov processes and to associated reliability/survival analysis theory. After recalling some classical results, mainly based on [BaLi08], we focus on kernel estimation of semi-Markov characteristics, like sojourn time distributions in a state, semi-Markov kernel, Markov renewal and semi-Markov transition functions, based on [Ayh22] and [Mok25]. We construct nonparametric kernel estimators and we establish asymptotic properties of these estimators, when the sample size becomes large. Then we investigate associated reliability/survival analysis modelling and estimation. The qualities of the estimators are illustrated by a numerical example.

## References

- [BaLi08] V. S. Barbu, N. Limnios, Semi-Markov Chains and Hidden Semi-Markov Models toward Applications - Their use in Reliability and DNA Analysis, Lecture Notes in Statistics, vol. 191, Springer, New York, 2008. ISBN 978-0-387-73171-1.
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- [Mok25] F. Mokhtari, C. Ayhar, V. S. Barbu, S. Rahmani, Kernel estimators of Markov renewal and semi-Markov transition functions of semi-Markov systems, to appear in Journal of Nonparametric Statistics, 1-23, 2025.