

*11:05-11:40 Bojana Jovanović (Faculty of Sciences and Mathematics, University of Niš, Serbia)*

**Capturing memory and randomness in epidemic dynamics**

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This presentation introduces a stochastic epidemic model that extends classical compartmental approaches by incorporating memory through Volterra integral equations. Random incubation, infectiousness, and immunity periods are described by general probability distributions, while the transmission coefficient is modeled by an Ornstein-Uhlenbeck process to account for environmental variability. The model further includes vaccination and waning immunity, resulting in a realistic framework for epidemic dynamics. The presentation focuses on the mathematical analysis of the system, including the proof of existence and uniqueness of a positive global solution, sufficient conditions for extinction and persistence in mean, and numerical simulations validating the theoretical results. Joint work with prof. dr Jasmina Djordjević and prof. dr Nenad Šuvak.