The conference is supported by the National Laboratory for Health Security project RRF-2.3.1-21-2022-00006

On the role of the basic reproduction number in continuous and discrete systems modelling disease propagation

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This talk is about dynamical properties of an SIS model without vertical transmission. In the first part we give an overview, how the basic reproduction number $\mathcal{R}_0$ can be calculated in continuous, in discrete time, resp. in reaction-diffusion systems. Then the algorithm will be applied in these three cases. In the second part we examine the stability properties of a disease free equilibrium of a continuous time model and show that forward transcritical bifurcation takes place: a new locally asymptotically stable interior equilibrium emerges. After that we discretize the system by explicit Euler and a non-standard method of Mickens type and give conditions for the step size under which the dynamics of the discretized version resembles that of their continuous counterpart. Joint work with Sándor Kovács and Szilvia György.