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Mathematics and the pandemic: from populations to individuals

Mathematics has had a high-profile role in the COVID-19 pandemic, and even terms like "herd immunity" and "reproductive number" are household phrases. In this talk I will describe several mathematical models of COVID-19 transmission, and how they relate to data, first at the population scale, then at the scale of school transmission and finally at the person-to-person scale. At the population level, models are used for case forecasting; I'll outline our approach to this task and the challenges with forecasting at the present time. I will describe modelling heterogeneity in school transmission. Finally, I will outline new approaches to using virus RNA sequences to help us understand transmission dynamics at a high level of resolution.