



**Department of Mathematics**

**Colloquium**

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**The RAND Corporation and the Pardee RAND Graduate School**

*Time-horizon and cost factors: Unveiling the choices between suppression and mitigation for the next pandemic*

**Abstract:** The COVID-19 pandemic has called for swift action from local governments, which have instated non-pharmaceutical interventions (NPIs) to curb the spread of the disease. The swift implementation of social distancing policies has raised questions about the costs and benefits of strategies that either aim to keep cases as low as possible (suppression) or aim to reach herd immunity quickly (mitigation). While curbing COVID-19 required blunt instruments, it is unclear whether a less-transmissible and less-deadly emerging pathogen would justify the same response. This presentation will first offer a brief overview of recent RAND research, focusing on modeling the interplay between infectious disease dynamics and adaptive protective behaviors in the contexts of influenza and COVID-19. The subsequent discussion centers on utilizing a parsimonious transmission model, framing the social distancing dilemma of lives versus livelihoods as a boundary value problem through calculus of variations. In this setup, society balances the costs and benefits of social distancing contingent on the costs of reducing transmission relative to the burden imposed by the disease. Our approach involves identifying strategies that emerge from the problem structure, rather than being imposed a priori. We find that the relative time-horizon of the pandemic (i.e., the time it takes to develop effective vaccines and treatments) and the relative cost of social distancing influence the choice of the optimal policy. Unsurprisingly, we find that the appropriate policy response depends on these two factors. We discuss the conditions under which each policy archetype (suppression vs. mitigation) appears to be the most appropriate. The presentation concludes with a concise discussion of future research ideas and proposals.

**Wednesday February 28, 2024**

**2:15 - 3:15 PM**

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**Faculty Host: Maria R. D'Orsogna**

