Joint Condensed Matter and

Center for Soft Matter and Biological Physics

Seminar

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"Systems Sciences, Behavioral Complexities, and the Challenge of Dynamic Modeling of the Spread of COVID-19"

Date/Time: *Monday, September 28, 2020, 4:00pm-5:00pm*

Virtual: *Zoom Link* https://virginiatech.zoom.us/j/92680700569

Abstract: Mathematical modeling is essential for understanding the spread of an infections disease and developing proper policies to contain it. In the case of COVID-19, however, we are dealing with a unique complex situation that requires revisiting conventional models and including several dynamic and behavioral mechanisms that are specific to this novel virus. To mention a few characteristics: 1) A large fraction of COVID-19 patients are asymptomatic and undiagnosed, 2) the virus is novel thus it seems that almost all human population are susceptible, 3) there is a considerable delay between exposure to the virus and the symptom onset, 4) risks are high; the infected fatality rate is considerable, 5) test capacities and their accuracy are limited, and 6) public risk perception has been changing and it influences people's behavior. Therefore, from a systems science perspective, we are dealing with a complex system that is only partially observable with considerable delays and inaccuracy, and our observations are influencing the (human-side of the) system. To elaborate this point, I will offer three examples of my recent modeling efforts, in collaboration with several colleagues. First, I will offer an example of how the number of unknown cases of COVID-19 can be estimated using a dynamic simulation model; second, I will report on a project to estimate the impact of weather on transmission of the disease, and third, I will offer a model of estimating the spread of COVID-19 in universities and optimal university-level policies to contain the disease. Finally, I will reflect on these experiences from a systems science point of view and complexity theories.

Navid Ghaffarzadegan is an associate professor in the Department of Industrial and Systems Engineering at Virginia Tech. He develops system dynamics simulation models to study complex social systems and policy problems. The main application areas of his research include science policy and health policy. His research projects have been supported by various organizations such as NIH and NSF, and corporations such as Dell, Inc. Prior to joining Virginia Tech, Navid was a postdoctoral researcher at MIT, Engineering Systems Division.