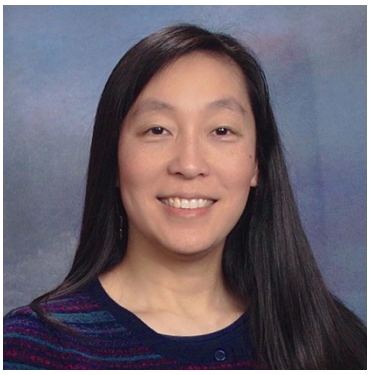
SMU Lyle School of Engineering

Operations Research and Engineering Management
Seminar Series

Research Seminar

Balancing the Protection of Covid-19 At-Risk Populations while Reopening Communities



Dr. Victoria Chen
Professor
Department of Industrial, Manufacturing, & Systems Engineering
University of Texas at Arlington
Friday, September 10, 2021
11:15 a.m. – 12:30 p.m.
https://smu.zoom.us/j/97906267193

Abstract
As communities consider reopening during the COVID-19 pandemic, they are facing two conflicting objectives. The first is to minimize cases of severe illness leading to hospitalizations and potential fatalities. The second is to revive the U.S. economy, K-12 education, and the livelihoods of millions of Americans. Lockdowns address the first but are detrimental to the second. Phased reopening pursues the second, but once communities reopen, control over

transmission is lost. Public health decision-makers rely on SEIR (Susceptible-Exposed-Infectious-Removed) models to predict the trajectory of infectious disease outbreaks and pandemics. However, optimization of strategies is not explored with SEIR models, making it difficult to uncover new promising strategies for mitigating pandemic outcomes.

This talk first discusses information available during the COVID-19 pandemic for informing decisions and then presents a linear programming (LP) optimization that enables computationally efficient study of the delicate balance between the expected fatality rate and the level of normalcy in the community. Given the disproportionate fatality characteristics of COVID-19 among those in different age groups or with an underlying medical condition or those living in crowding, the key is a framework focused on "COVID-19 key contacts" to protect individuals at higher risk from the rest of the population. The LP solutions uncover prioritization guidance on social distancing, personal protective equipment, COVID-19 testing, and vaccination. An online version debuted in July 2020 and was awarded a 3rd place prize in *The C3.ai COVID-19 Grand Challenge*. Finally, simulations are presented using an agent based SEIR epidemic model for Tarrant County that implements the key contact structure and LP prioritization. This is joint work Yuan Zhou, Jay M. Rosenberger, Alireza Fallahi, Amith Viswanatha, Jingmei Yang, Yasaman Ghasemi, Nilabh S. Ohol, Ashkan A. Farahani, Jeffrey B. Guild.

Online content: https://cosmos.uta.edu/projects/covid-19/
https://c3.ai/c3-ai-covid-19-grand-challenge/

Biography: Dr. Victoria Chen is a Professor in the Department of Industrial, Manufacturing, & Systems Engineering at The University of Texas at Arlington. She also serves as the Director of Doctoral Studies and the Director of the Center on Stochastic Modeling, Optimization, & Statistics (COSMOS). She served as Interim Department Chair in 2012-14 and Director of Faculty & Student Research Development in 2014-17. She was awarded the George & Elizabeth Pickett Professorship in 2015 and 2016, and she was inducted into the University of Texas at Arlington Academy of Distinguished Teachers in 2019. She holds a B.S. in Mathematical Sciences from The Johns Hopkins University, and M.S. and Ph.D. in Operations Research from Cornell University. Her research utilizes statistical perspectives to create new operations research methods for complex decision-making problems in a variety of domains. She has expertise in the design of experiments, statistical modeling, and data mining, particularly for computer experiments, adaptive dynamic programming, surrogate optimization, and stochastic optimization. She has studied applications in energy, environmental sustainability, health care, and transportation. She is the current Executive Board Secretary for The Institute for Operations Research and the Management Sciences (INFORMS). She co-founded the INFORMS Section on Data Mining in 2004, founded the annual INFORMS Artificial Intelligence & Data Mining Workshop in 2006, and has been active with the Forum for Women in OR/MS since 2001. Finally, Dr. Chen has been a guest editor for the international journal *Annals of Operations Research* since 2006.