DEPARTMENT of INDUSTRIAL ENGINEERING
UNIVERSITY of HOUSTON

FRIDAY SEMINAR SERIES
BROADEN HORIZONS | EXTEND MINDS

Lewis Ntaimo is Professor and Department Head
Department of Industrial and Systems Engineering
TAMU
College Station, TX

Date: Friday, April, 14, 2023

Time: 1 - 1:50 pm

Location: D2 LECT 2

Integrated Chance Constraints Programming for Optimal Vaccination Strategies for COVID-19

Abstract: COVID-19 is caused by Severe Acute Respiratory Syndrome SARS-CoV-2 virus and was declared a pandemic by the World Health Organization in early 2020. Despite concerted efforts by health authorities worldwide to contain the disease, the virus continued to spread and mutate leading to new variants with uncertain transmission characteristics. There still remains a need for data-driven models for determining optimal vaccination strategies that adapt to new variants and uncertain vaccine efficacy. Motivated by this challenge, we derive integrated chance constraints stochastic programming epidemiology models for finding optimal vaccination policies for multi-community epidemics that incorporate population demographics, age-related heterogeneity in disease susceptibility and infectivity, vaccine efficacy, and the decision-maker's level of risk. An optimal vaccination strategy specifies the proportion of individuals in a given community and household type to vaccinate to bring the reproduction number below one. The new models were tested on real data for seven neighboring counties in the U.S. state of Texas. The results reveal, among other findings, that vaccination strategies for controlling outbreaks should prioritize vaccinating specific households and age groups with relatively high combined susceptibility and infectivity.

Biography: Lewis Ntaimo is Professor and Department Head, and Sugar and Mike Barnes Department Head Chair of the Wm Michael Barnes '64 Department of Industrial and Systems Engineering at Texas A&M University. He has been with the university since 2004 after obtaining his Ph.D. in Systems and Industrial Engineering from the University of Arizona. He received his Master of Science in Mining and Geological Engineering in 2000, and a Bachelor of Science in Mining Engineering in 1998, both from the University of Arizona. Ntaimo's primary research interest is in modeling and algorithms for decision-making problems involving uncertainty and risk, systems modeling, process optimization, and computer simulation. Applications of interest include vaccination policies for epidemics, wildfire management, healthcare management, college counseling and psychological service management, and power systems operations and maintenance. His research over the years has been funded by United States federal agencies and industry. Ntaimo is a member of INFORMS and IISE, and he is the Past-President of the INFORMS Minority Issues Forum. He has served on several journal editorial boards including *IISE Transactions*, *IISE Transactions on Healthcare Systems Engineering, Journal of Global Optimization, and Computational Optimization and Applications*.