

Laboratory for Industrial and Applied Mathematics

LIAM Distinguished Lecture Series

Travel Frequency and Infectious Diseases

Professor Daozhou Gao, Shanghai Normal University

Friday, August 10, 2018

10:30am – 11:30am

LIAM Lab Kinsmen 277

Abstract: Empirical and statistical evidences suggest that the number of trips taken per year varies significantly among people by age, gender, income, occupation, ethnicity, region and so on. Only a small fraction of people are frequent travelers while most travel occasionally or never. To take the difference in travel frequency into consideration, we propose a multipatch epidemic model where humans in each patch are divided into susceptible occasional, infectious occasional, susceptible frequent, and infectious frequent travelers. The basic reproduction number R_0 is derived which completely governs the global dynamics of the model system. Lower and upper bounds of the single and multiple patch reproduction numbers are given and the disease can become endemic or extinct even though it dies out or persist in each isolated patch. Both analytical and numerical approaches show that the model without distinguishing the difference in travel frequency tends to underestimate the infection risk. Several numerical examples are presented to illustrate the impact of changes in modern travel on disease spread.

Speaker: Daozhou Gao is a professor at the Department of Mathematics, Shanghai Normal University. He obtained his PhD from University of Miami in 2012 and was a postdoctoral fellow at Professor Travis Porco's laboratory, University of California. His research focuses are Mathematical Biology and Differential Equations, with more than 20 papers on Infectious Diseases Modelling and Analysis.

