Statistical Sciences
UNIVERSITY OF TORONTO

SEMINAR SERIES 2018-2019

When:	**Thursday, December 6, 2018**
Time:	**3:30 – 4:30 pm**
	Refreshments at 3:15 pm
Where:	**Sidney Smith Hall Rm 2105**
Speaker:	**Forrest Crawford, Yale University**
Host:	**Linbo Wang**

Mechanistic and Agnostic Estimation for Infectious Disease Epidemiology

Two competing paradigms dominate statistical approaches to estimating the effects of infectious disease interventions in interconnected groups. "Mechanistic" models capture dynamic features of disease transmission, permitting inferences with real-world interpretations and detailed predictions. "Agnostic" approaches refrain from specifying the full joint distribution of the data, and provide inferences that are robust to model mis-specification.

Epidemiologists disagree about which of these paradigms is superior for studies of infectious disease interventions (e.g. randomized vaccine trials, observational studies of risk factors), with competing claims about model realism, bias, and credibility of inferences. In this presentation, I define a formal structural model of infectious disease transmission, and ask what causal features of this process agnostic estimates recover.

I exhibit analytically and by simulation the circumstances under which regression coefficients in a marginal model imply an effect whose direction is opposite that of the true individualistic treatment effect. Furthermore, I show that widely recommended randomization designs and estimators may provide misleading inferences about the direct effect of an intervention – such as a vaccine – when outcomes are contagious. I illustrate these ideas in a large cluster-cohort study of tuberculosis outcomes within households in Lima, Peru.