Industrial and Systems Engineering Seminar

Link Removal for Epidemic Control over Networks

Wednesday, September 25

3:15 PM – Refreshments before the Seminar

3:30 PM – Graduate Seminar

Mechanical Engineering Room 4125 A & B

Professor Eva Enns

Assistant Professor

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Many models of infectious disease do not explicitly consider the underlying contact network through which the disease spreads. However, network structure can greatly influence the dynamics of an epidemic and has implications for infectious disease control policies. In this talk, I will address the problem of leveraging network structure in designing disease control policies. In particular, I will consider the problem of identifying which links to remove from a contact network in order to maximize the number of individuals who are protected from infection. I will show how this problem can be posed as a non-convex quadratically-constrained quadratic program (QCQP), from which a link removal algorithm can be derived. Evaluation of the QCQP algorithm on standard network models demonstrates that it exhibits near-optimal performance in quarantining infected nodes and outperforms other intuitive link removal algorithms, such as removing links in order of edge centrality. I will then identify the epidemiological conditions for which different link removal approaches, including optimal quarantining, are the preferred strategy for epidemic control.

Bio: Eva Enns is an Assistant Professor in the Division of Health Policy and Management in the University of Minnesota School of Public Health. Her research is concerned with the application of mathematical, economic, and systems analysis to problems in health policy, health operations, and medical decision making. In particular, she has focused on the influences of network structure and contact patterns on the spread of infectious disease and developing methods that make use of network structure in designing optimal disease control policies.
She completed her Ph.D. in Electrical Engineering with a minor in Management Science and Engineering at Stanford University in 2012. She also received an SB degree in Electrical Engineering from MIT (2006) and an MS degree in Electrical Engineering from Stanford University (2008).