

INDUSTRIAL & SYSTEMS ENGINEERING SEMINAR

Wednesday, November 30

3:15 PM – Refreshments before the seminar

3:30 PM – Graduate Seminar

Mechanical Engineering Room 4125 A & B



Reducing Waiting Time in Emergency Departments: Flow Redesign to Harness Operational Triage Information

Professor Mark P. Van Oyen
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Our team of Emergency Department (ED) physicians and healthcare operations researchers has used queuing theory and discrete event simulation models of ED patient flow to explore how valuable information collected at triage can be used to redesign the admission and care processes of the ED. In this talk, we first carefully analyze models that quantify the performance of the “Streaming” patient flow design introduced by Flinders Medical Centre that utilizes Admit/Discharge predictions at triage. After identifying serious drawbacks to Streaming, we modify the approach to yield a new “Virtual Streaming” flow design. Simulation testing suggests that Virtual Streaming is a robust policy that is easily implemented and can significantly reduce congestion, as measured by a weighted average of Time to First Treatment and Length of Stay. Further, we analyze a new complexity-based triage procedure for ED’s that distinguishes relatively simple from relatively complex cases. Using easily implementable class-based priority rules for admission/sequencing, the results suggest that this approach can yield significant decreases in both the Rate of Adverse Events (to capture patient safety) and Length of Stay (to quantify operational efficiency and access). The work clarifies the operational issues underlying the new streaming-based and the traditional “pooling” designs. We also generate insights into how EDs can further improve their performance by better use of triage predictions that estimate each patient’s treatment length/complexity. The ED data used reflects an ED at a large academic hospital, but the models are quite general, and sensitivity analysis is performed to extrapolate the benefits for a wide range of hospital environments.

BIO: Dr. Mark P. Van Oyen has served as an Associate Professor of Industrial and Operations Engineering (IOE) at the University of Michigan since 2005. His core interests focus on the analysis, design, control, and management of operations systems, with emphasis on healthcare, service operations, and supply chains and how they can be designed for greater performance, flexibility, and resilience. His research also contributes to applied probability and the design and control of queuing networks. His awards include the 2010 Pierskalla Award, IOE Dept. Faculty of the Year for 2008-9, ALCOA Manufacturing Systems Faculty Fellow, a best paper award from *IIE Transactions*, and Researcher of the Year from Loyola University Chicago’s School of Business. He has served as Associate Editor for *Operations Research*, *Naval Research Logistics*, and *IIE Transactions* and Senior Editor for *Flexible Services & Manufacturing*. He was a faculty member of the Northwestern Univ. Sch. of Engineering (1993-2005) and Loyola Univ. of Chicago’s Sch. of Bus. Admin. (1999-2005). He has received grants from the National Science Foundation (NSF), Office of Naval Research (ONR), EPRI, ALCOA, General Motors, and the VA. In industry, he was a researcher with GE Corporate R&D as well as an analysis and simulation engineer with Lear Siegler’s Instrument & Avionic Sys. Div.

FOR MORE INFORMATION ON PROFESSOR VAN OYEN’S RESEARCH, PLEASE VISIT:
<http://ioe.engin.umich.edu/people/fac/vanoyen.php>