

## Department of Systems Engineering and Engineering Management

### Seminar Series

## **An Integrated Scheduling and Operations Approach to Airport Congestion Mitigation**

**Dr. Alexandre JACQUILLAT**

Assistant Professor

Operations Research and Public Policy Heinz College,  
Carnegie Mellon University, USA

Date	15 March 2017 (Wednesday)
Time	2:00pm - 3:00pm
Venue	P7303, 7/F, AC1 (Near lift 6)

### **Abstract**

Most flight delays are created by imbalances between demand and capacity at the busiest airports. Absent opportunities for capacity expansion, airport congestion can only be mitigated through improvements in the utilization of airport capacity and the implementation of demand management measures. This talk presents an integrated approach that jointly optimizes airport scheduling interventions at the strategic level and the utilization of airport capacity at the tactical level, subject to scheduling and capacity constraints. The capacity utilization part involves controlling the runway configuration and the balance of arrival and departure service rates to minimize congestion costs. The schedule optimization reschedules a subset of flights to reduce the demand-capacity mismatches, while minimizing interference with airline competitive scheduling. We develop an original iterative solution algorithm that integrates an Integer Programming model of scheduling interventions, a Dynamic Programming model of capacity utilization, and a Stochastic Queuing Model of airport congestion. The algorithm is shown to converge in reasonable computational times. Computational results for JFK Airport suggest that very substantial delay reductions can be achieved through limited changes in airline schedules. It is also shown that the proposed integrated approach to airport congestion mitigation performs significantly better than the typical sequential approach where scheduling and operational decisions are made separately.

## About the Speaker

**Alexandre Jacquillat** is an Assistant Professor of Operations Research and Public Policy at Carnegie Mellon University's Heinz College, with cross-appointments in the Department of Civil and Environmental Engineering and at the Tepper School of Business. His research develops and applies stochastic models and optimization methodologies to promote more efficient, reliable, and sustainable infrastructure and transportation systems. His primary areas of focus are air traffic management systems and ride-sharing systems. Alexandre is the recipient of several research and leadership awards, including the George B. Dantzig Dissertation Award and the Transportation Science and Logistics Dissertation Prize from INFORMS, the Milton Pikarsky Memorial Award from the Council of University Transportation Centers (CUTC), the Anna Valicek Award from AGIFORS, and the L.E. Rivot Medal from the French Academy of Science.

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