

SEMINAR SERIES
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**Price and Service Discrimination in Queueing Systems:
Incentive Compatibility of $G c \mu$ Scheduling**

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12:30 p.m.
214 Lindner Hall**

This talk considers the optimal mix of service quality grades and prices that a queueing system (the "firm") provides to heterogeneous, utility-maximizing customer types under full and asymmetric information. Quality of service is measured by the delay distributions that customers experience, and general delay cost functions model customer delay sensitivities. The firm directly controls the number of grades, their prices, and scheduling. An executable proposal approximates the unknown optimal scheduling policy by the Generalized $c \mu$ ($G c \mu$) rule, which yields an analytic tool to specify scheduling, delay distributions and prices under realistic convex delay costs.

Under full information, queuing classes correspond to customer types resulting in perfect service discrimination, while service grade-specific prices allow perfect price discrimination. A benchmarking example investigates the value of differentiated service. Under asymmetric information, queuing classes correspond to service grades, which typically results in imperfect price and service discrimination. A mechanism that results in perfect service discrimination is called *service grade incentive-compatible*. For arbitrary delay cost functions and homogeneous service time distributions, it is shown that a mechanism using $G c \mu$ scheduling is grade and also rate incentive-compatible, meaning that it also induces the centralized-optimal rates. We explain how negative feedback inherent in dynamic $G c \mu$ scheduling and time-dependent pricing can reinforce each other to yield such optimal rate incentive compatibility with heterogeneous service times. Finally, we analyze multi-plan pricing, which offers all customers a menu with a choice of multiple rate plans.

Jan A. Van Mieghem is Associate Professor of Operations Management in the Department of Managerial Economics and Decision Sciences, Kellogg Graduate School of Management, at Northwestern University. His degrees include Burgerlijk Ingenieur in Electrical Engineering from the University of Leuven in Belgium, an M.S. in Electrical Engineering (Management) from Stanford University, and a Ph.D. in Business from Stanford. His research deals with the analysis and management of business processes that deliver goods and services; specific research focuses on management and investment under uncertainty, such as pricing and dynamic control of stochastic processing networks. His papers have appeared in *Management Science*, the *European Journal of Operational Research*, and the *Annals of Applied Probability*, among others, and he is co-author of the textbook *Managing Business Process Flows* (Prentice-Hall, 1999). He serves on the editorial boards of *Management Science*, *Operations Research*, and *Manufacturing & Service Operations Management*. At Northwestern he teaches courses in Operations Management (MBA core course), Operations Strategy (MBA elective), and Manufacturing Strategy (Master in Manufacturing core course). Prior to joining Kellogg, Professor Van Mieghem worked at Canon Research Center (design engineering), Seagate Technologies (manufacturing), and McKinsey & Company (management consulting). He was a founder and composer of the rock group *Tullamore Dew* and of the classical ensemble *The Carulli Trio*.