



SMU | LYLE

Engineering Management, Information, and Systems
Seminar Series

Research Seminar

On Process Capacity



Dr. Milind Dawande

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Area Coordinator of the Operations Management Group at
the Naveen Jindal School of Management
The University of Texas at Dallas**

Friday, April 23, 2021

11:00 a.m. – 12:15 p.m.

Zoom link: <https://smu.zoom.us/j/95095343594>

Abstract: In this talk, we will discuss recent work on the notion of the capacity (or long-term throughput) of a process. The simple “bottleneck formula” is widely discussed in textbooks to illustrate the calculation of the capacity of a process: the capacity of each resource is first computed by considering that resource in isolation; the bottleneck resources are those with the least capacity, which is defined to be the capacity of the process. It is now well-known that this formula correctly computes process capacity only in processes with special structures – e.g., processes with no collaboration or those with no multitasking. We provide further clarity on determining process capacity by showing that it is hard to compute process capacity exactly and also to approximate it to within a reasonable factor. These results are based on a novel characterization of process capacity that relates it to the fractional chromatic number of the associated “collaboration graph.” An important implication is that it is unlikely that we can replace the bottleneck formula with a simple, but close, approximation of process capacity. On the positive side, we show that capacity can be efficiently computed for processes for which the collaboration graph is a perfect graph. We will also briefly discuss (1) the capacity of processes with batch processing and setup times, and (2) the associated notions of a bottleneck structure of activities and a bottleneck set of resources.

Biography: Milind Dawande is currently Mike Redeker Distinguished Professor of Management and Area Coordinator of the Operations Management Group at the Naveen Jindal School of Management, The University of Texas at Dallas. His research interests are broadly in Optimization Theory and its applications in Manufacturing and Service Operations. Prior to joining academia, he was a Research Staff Member at IBM's T. J. Watson Research Center in Yorktown Heights, NY. He is currently Department Editor of the Manufacturing Operations department of the journal *Production and Operations Management*. He also serves or has served as Senior/Associate Editor in several other journals in the field, including *Manufacturing & Service Operations Management*, *Production and Operations Management*, and *Journal of Scheduling*.