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Department of Civil and Environmental Engineering

## **Traffic behavior in cities: A macroscopic approach**

by

**Professor Monica Menendez**

Associate Dean of Engineering for Graduate Affairs and a Professor of  
Civil and Urban Engineering at New York University Abu Dhabi (NYUAD)

**Host: Assistant Professor Kaidi Yang**

**Department of Civil and Environmental Engineering**

**Date: 31 March 2023, Friday**  
**Time: 10:00 am – 11:00 am**  
**Venue: EA-06-04**  
**College of Design and Engineering**  
**National University of Singapore**  
**9 Engineering Drive 1**  
**Singapore 117575**



**Scan code to  
register**

**\*\*\*Seats are limited. Please register early. All are welcome and admission is free\*\*\***

### **Abstract**

In this presentation, we will discuss how to bring together concepts from statistical physics and transportation engineering into a single science of traffic networks, with the goal of improving the performance of urban traffic, ultimately making our cities more sustainable. We will show that traffic and the ensuing congestion patterns for any given city are reproducible across days. Hence, it is enough to monitor the traffic performance of only a few roads to classify daily patterns and the resulting congestion patterns, allowing cities to reduce monitoring costs. In fact, road and bus network topology can explain around 90% of the empirically observed variation in network capacity for over 40 cities around the world. Moreover, it is possible to relate the road level dynamics to the network level dynamics by observing the number and size of traffic congestion pockets. This allows us to use concepts from physics (such as percolation) to describe the propagation of congestion, so that we can model it using sparse network-level data. It also gives us insights into the ability of different networks to cope with congestion, and the moment at which such congestion becomes so widespread that the whole network collapses.

## Speaker's Biography



**Monica Menendez** is the Associate Dean of Engineering for Graduate Affairs and a Professor of Civil and Urban Engineering at New York University Abu Dhabi (NYUAD). She is also the Director and Lead PI of the CITIES Research Center; and the recipient of the NYUAD Distinguished Research Award for 2021. Before joining NYUAD in 2018, Prof. Menendez was the Director of the research group Traffic Engineering at ETH Zurich. She holds a Ph.D. (2006) and a M.Sc. (2003) in Civil and Environmental Engineering from UC Berkeley, and a dual degree in Civil Engineering and Architectural Engineering (2002) from the University of Miami.

Her research interests include multimodal transportation systems paying special attention to new technologies and information sources. Prof. Menendez is a member of multiple editorial boards for top journals in Transportation, and a number of international organizations, including the International Advisory Committee of the International Symposium on Transportation and Traffic Theory (ISTTT), and the Mohammed bin Rashid Academy of Scientists (MBRAS). She is the author of around 100 peer-reviewed journal publications and over 200 conference contributions, book chapters, editorials, and technical reports. In the last five years, five of the papers that she has co-authored, have received best-paper awards.

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### Map of Seminar Room EA-06-04. 9 Engineering Drive 1, Singapore 117575

Seminar Room 4 (EA-06-04) is on floor 6.

