Choice models have been the workhorse of travel demand modelers in transportation since the 1970s. They are designed to capture complex aspects of human behavior and are operational in the sense that they are used intensively by practitioners. Still, they have not made their way to the vast field of operations research, or only in a timid fashion.

In this lecture, we are trying to link choice models and optimization. First, we show that the first principles of choice modeling are actually founded on optimization. We then give a short introduction to some of the most popular choice models. Using a linear specification, we then discuss how they can be introduced into non-trivial Mixed Integer Linear Problems. Finally, we show how scheduling algorithms can be used to model complex travel behavior.

Short bio
Born in 1967, Michel Bierlaire holds a PhD in Mathematical Sciences from the Facultés Universitaires Notre-Dame de la Paix, Namur, Belgium (University of Namur). Since 2009, he has been the director of TraCE, the Transportation Center. Since September 2017, he has been the head of the Civil Engineering Institute at EPFL. His primary expertise is designing, developing, and applying models and algorithms to design, analyze, and manage transportation systems. Namely, he has been active in demand modeling (discrete choice models, estimation of origin-destination matrices), operations research (scheduling, assignment, etc.), and Dynamic Traffic Management Systems.