

UNIVERSITY OF PUERTO RICO  
RIO PIEDRAS CAMPUS  
FACULTY OF NATURAL SCIENCES  
DEPARTMENT OF MATHEMATICS

**Title: Mean field game theory and some applications**

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**Abstract**

Mean field game theory studies models involving a large number of non-cooperative players which are individually insignificant but collectively have significant impact on the dynamics or/and cost of each player. This theory has wide backgrounds including engineering, economics and finance, social science, public health, and others. An important issue for such games is to develop low complexity strategies and examine their performance. This talk will describe an interacting particle approach to model the game and the idea of consistent mean field approximations. When the dynamic programming approach is applied for the underlying optimal control problem, this leads to a limiting system of two equations: an HJB equation and a Fokker-Planck equation, where the latter is associated with a McKean-Vlasov SDE. Concerning techniques, we will also discuss the maximum principle approach. We further present a generalized model with a major player which generates stochastic mean field dynamics and causes challenge in analysis. We will also discuss robustness issues in mean field games.

Some applications, including stochastic growth models, will be described.

Wednesday, April 15, 2015  
10:30 - 11:30 am  
A-229