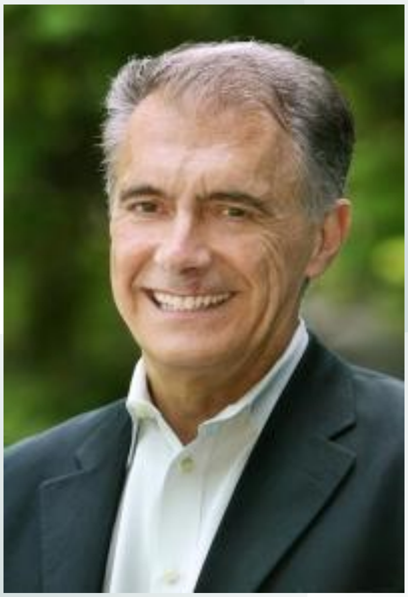
Columbia University
Department of Mathematics

2990 Broadway
New York, NY 10027

FALL 2016

MINERVA LECTURES



René Carmona

(Princeton)

"Mean Field Games"

Since its inception about a decade ago, the theory of Mean Field Games has rapidly developed into one of the most significant and exciting sources of progress in the study of the dynamical and equilibrium behavior of large systems. The introduction of ideas from statistical physics to identify approximate equilibria for sizeable dynamic games created a new wave of interest in the study of large populations of competitive individuals with "mean field" interactions.

The lectures will rely on examples from economic growth theory, flocking, herding and congestion models for crowd behavior, systemic risk, cyber security, bank runs and liquidity crises, information percolation on social networks, … to introduce the mathematical challenges raised by the intractability of most of these large scale equilibrium problems.

We shall quickly review the original partial differential equations approach to the solution of these stochastic games, and introduce a probabilistic approach based on analysis on spaces of probability measures, the theory of forward/backward stochastic differential equations, and the optimal control of McKean-Vlasov stochastic differential equations.

We shall show how these tools can be brought to bear in an effort to solve some of these challenging equilibrium problems.

Thu Oct 20, 4.10 pm, Room 903 SSW

Tue Oct 25, 4.10 pm, Room 507 Math

Thu Oct 27, 4.10 pm, Room 903 SSW

Fri Oct 28, 12.00 pm, Room 520 Math