

# UCCS Department of Mathematics & MAE

## Joint Colloquium

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**RUTGERS UNIVERSITY**



**DATE:**

FRIDAY  
MARCH 2, 2018

**TIME:**

12:30PM-1:30PM  
(REFRESHMENTS AT 12:15PM)

**LOCATION:**

UNIVERSITY CENTER  
ROOM # 302

## **Control methods for large groups: multi-scale models for social dynamics**

*Abstract:* The modeling of large group dynamics requires the development of new mathematical tools, in particular for control problems. Such dynamical models are often referred to as social dynamics: the examples we have in mind span both cases of real dynamics, such as crowd in motion, but also virtual dynamics, such as opinion formation in social networks. Moreover, this type of models finds application also in more traditional engineering areas, such as robot coordination, flight formations and other.

One may look at different scales, starting from a detailed microscopic description at the level of single agent. Then mean-field or other averaging techniques can be used to obtain PDEs or measure-theoretic models. The control paradigm is that of centralized sparse control algorithm, thus we assume that a centralized controller is free to act on any agent of the system, but with the constraint of acting only on a small number of agents.

First we show results at microscopic scale and illustrate the main difficulties in passing to the limit (in mean-field sense) for control algorithms. Then we focus on measure-theoretic multi-scale models. The framework is that of non-local transport-type equations in the space of finite Radon measures endowed with a generalized Wasserstein metric. Finally, we show a new approach to deal with the continuum and mixed-scale cases.

For More Information please contact the UCCS Math Department at  
(719) 255-3311 or <http://www.uccs.edu/math>