

## **Cooperative control and optimization of networked systems**

Instructors: Jorge Cortés and Sonia Martínez (Department of Mechanical and Aerospace Engineering at the University of California, San Diego).

Abstract: (This course will be covered in 10 hours)

This course will present a mathematical approach to the analysis and design of networked systems. Networks pervade our world today and model complex social and biological interactions, communication systems such as the Internet and ad-hoc wireless systems, air, ground and electric transportation systems, and groups of robotic sensors. A lot is known about the design and use of the individual components, and yet the science of integrating the components into complex, self-organizing networks with predictable behavior is at a primitive stage. There is a need for mathematical tools, abstractions, and models that allow to reason rigorously about complex networks, and for techniques that help design autonomous and adaptive networks of cooperating agents. This crash course will provide an accessible introduction to several tools from geometry, graph theory, dynamical systems and control theory, and demonstrate their applicability in the study of the cooperative control and optimization of networked systems.