Università degli Studi di L'Aquila - Dipartimento di Ingegneria e Scienze dell'Informazione e Matematica

Course catalogue

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Programme of Module "Modelling and control of networked distributed systems"

- Code: DT0011
- Type of course unit: Compulsory (Master Degree in Mathematical Engineering curriculum Comune)
- Level of course unit: Postgraduate Degrees
- Semester: 1

Number of ects credits: (Master Degree in Mathematical Engineering) 6 (workload 150 hours)

Teachers: Giordano Pola

1	**Course objectives**	The aim of this course is to provide basic knowledge of the analysis and design of dynamic multiagent networks.
2	**Course content and learning outcomes (dublin descriptors)**	Topics of the module include: • Introduction to graph theory: graphs; matrices representation; algebraic and spectral graph theory; graph symmetries. • The agreement protocol - the static case: undirected and directed networks; agreement and markov chains; the Factorization Lemma. • The agreement protocol - Lyapunov and LaSalle: agreement via Lyapunov functions, agreement over switching digraphs, edge agreement, generalizations to nonlinear systems. • Formation Control: formation specification-shapes and relative states; shape based control; relative state based control, dynamic formation selection, assigning roles. • Mobile Robots: Cooperative robotics; weighted graph based feedback; dynamic graphs; formation control revisited; the coverage problem.
3	**Course prerequisites**	Linear Algebra. Linear control systems. Stability theory for linear control systems.
4	**Teaching methodsand language**	Lectures and exercises. **Language**: English **Reference textbooks** • M. Mesbahi and M. Egerstedt, ***Graph Theoretic Methods in Multiagent Networks***. Princeton University Press. 2010. *http://press.princeton.edu/titles/9230.html*
5	**Assessment methods**	Written and oral exam