

International Graduate School on Control

Independent Graduate Modules – one 21 hours module per week (3 ECTS)

Deadline for advance registration to each module: 20/12/2013

Locations: Belgrade (Serbia), Hangzhou (China), Istanbul (Turkey),

L'Aquila (Italy), Paris <Gif-sur-Yvette> or Grenoble (France), Saint-Peterburg (Russia)

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|----------------------------------------------------------|---------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|
| M1 20/01/2014 – 24/01/2014 | <i>Sliding Mode Control and Observation</i> | Christopher Edwards , University of Exeter, UK |
| M2 27/01/2014 – 31/01/2014 | <i>The Scenario Approach - Theory and Applications</i> | Marco C. Campi , University of Brescia, Italy Simone Garatti , Politecnico di Milano – DEI, Italy |
| M3 03/02/2014 – 07/02/2014 | <i>Randomized Algorithms for Systems, Control and Networks</i> | Roberto Tempo / Fabrizio Dabbene , CNR-IEIT, Politecnico di Torino, Italy |
| M4 10/02/2014 – 14/02/2014 | <i>Analysis and Synthesis for linear systems subject to control saturation</i> | Sophie Tarbouriech / Luca Zaccarian , CNRS LAAS, Univ. Toulouse, France |
| M5 17/02/2014 – 21/02/2014 | <i>Moments, positive polynomials and LMIs for optimal control</i> | Didier Henrion / Jean-Bernard Lasserre , CNRS LAAS, Univ. Toulouse, France |
| M6 24/02/2014 – 28/02/2014 | <i>Feedback control of quantum systems</i> | Mazyar Mirrahimi , INRIA Rocquencourt / Pierre Rouchon , Mines-ParisTech, France |
| M7 03/03/2014 – 07/03/2014 | <i>Embedded control systems design issues</i> | Pedro Albertos / Alfons Crespo , Universidad Politécnica de Valencia, Spain |
| M8 10/03/2014 – 14/03/2014 | <i>Stability and Control of Time-delay Systems</i> | Wim Michiels , KU Leuven, Belgium / Silviu I. Niculescu , CNRS L2S, Gif-sur-Yvette, France |
| M9 - BELGRADE 17/03/2014 – 21/03/2014 | <i>Nonlinear Control Over Networks with Uncertain Sampling and Delays</i> | Miroslav Krstic , Univ California, San Diego, USA / Iasson Karafyllis , NTUA, Athens, Greece |
| M10 24/03/2014 – 28/03/2014 | <i>Arbitrated Network Control Systems and CPS</i> | Anuradha Annaswamy , MIT, USA |
| M11 – HANGZHOU 24/03/2014 – 28/03/2014 | <i>Adaptive and Passivity-based Control of Nonlinear Systems</i> | Romeo Ortega , CNRS L2S Gif-sur-Yvette, France |
| M12 31/03/2014 – 04/04/2014 | <i>Model Predictive Control</i> | Jan Maciejowski , University of Cambridge, UK |
| M13 07/04/2014 – 12/04/2014 | <i>Introduction to Nonlinear Control</i> | Hassan K. Khalil , Michigan State Univ, USA |
| M14 - L'AQUILA 14/04/2014 – 19/04/2014 | <i>Convergence theory for observers: Necessary, and Sufficient conditions</i> | Laurent Praly , Mines-ParisTech, France |
| M15 – SAINT PETERSBURG 14/04/2014 – 19/04/2014 | <i>Nonlinear Control for Physical Systems</i> | Roger W. Brockett , Harvard SEAS, USA / Alexandre L. Fradkov , RAS, Saint-Peterburg, Russia |
| M16 - BELGRADE 21/04/2014 – 25/04/2014 | <i>Distributed Control</i> | A. Stephen Morse , Yale University, USA |
| M17 - ISTANBUL 28/04/2014 – 02/05/2014 | <i>Introduction to Geometric Nonlinear Control Theory and Applications</i> | Witold Respondek , INSA Rouen, France |
| M18 05/05/2014 – 09/05/2014 | <i>Analysis and Design of Hybrid Control Systems</i> | Ricardo G. Sanfelice , University of Arizona, Tucson, USA |
| M19 - GRENOBLE 12/05/2014 – 16/05/2014 | <i>Adaptive Control: From needs to applications</i> | Ioan D. Landau , CNRS GIPSA-LAB, Grenoble, France / Alireza Karimi , EPFL, Switzerland |
| M20 19/05/2014 – 23/05/2014 | <i>Modeling and Control of Automotive and Aerospace Engines and Powerplants</i> | Ilya Kolmanovsky , University of Michigan / Stefano Di Cairano , Mitsubishi Elect. Res. Lab Boston, USA |

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| M3 03/02/2014 – 07/02/2014 | Randomized Algorithms for Systems, Control and Networks |
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Abstract of the course

In this course, we provide a perspective of the research area of randomization for systems, control and networks. In particular, we study several topics which are of interest when dealing with control of uncertain systems and networks described by graphs.

In these lectures, we demonstrate that randomization is a key tool to handle systems and control problems which can be solved only approximately due to partial or contaminated data, or because only local information about the network is available. Various techniques are developed to construct synchronous and asynchronous sequential algorithms for analysis and design. Convergence and optimality properties of these randomized algorithms are subsequently analyzed.

We also discuss several applications, which include the PageRank computation in the Google search engine, control design of unmanned aerial vehicles, sensor localization of wireless networks and opinion dynamics in social networks. The course is based on the book by R. Tempo, G. Calafiore, F. Dabbene, "Randomized Algorithms for Analysis and Control of Uncertain Systems, with Applications," 2nd edition, Springer, London, 2013.

- Topics:**
- Uncertain systems, networks and graphs
 - Monte Carlo and Las Vegas algorithms
 - Random sampling techniques
 - Probabilistic methods for control design
 - Distributed randomized algorithms

