



University of Pavia

Ph.D. School of Electrical and Electronics Engineering and Computer Science
Ph.D. School in Microelectronics

Doctoral Seminars on The LMI/BMI Approach to Optimal Control

Prof. Richard D. Braatz

Massachusetts Institute of Technology

July 1 – 4, 2019, Aula Seminari Magenta (ex Dip. di Elettronica), D floor
Università degli Studi di Pavia – Via Ferrata 5 - Pavia

The course is an introduction to linear and bilinear matrix inequality methods for dynamical systems analysis, state and output estimation, optimal feedback controller design, and related topics. The course uses many examples to demonstrate Lyapunov and linear matrix inequality-based methods that explicitly address actuator constraints, nonlinearities, and model uncertainties.

Date	Lecture topics
01/07/19 15:00 – 16:20	Brief review of matrix theory (fields, vector spaces, eigenvalues, eigenvectors, norms, quadratic and Hermitian forms, singular value decomposition)
01/07/19 16:20 – 17:40	Linear matrix inequalities, constraints, stability of linear and linear time-varying systems, Schur Complement Lemma
02/07/19 15:00 – 16:20	Computational complexity, convexity, ellipsoids, S-procedure, stability of uncertain systems
02/07/19 16:20 – 17:40	Bilinear matrix inequalities, optimizations with matrix inequality constraints
03/07/19 10:00 – 11:20	Stability margins, decay rate, process gains, performance margins
03/07/19 11:20 – 12:40	State feedback control analysis and design
03/07/19 14:00 – 15:20	State estimation, output estimation, estimation-based fault detection and diagnosis
04/07/19 10:00 – 11:20	Estimator-based output feedback design
04/07/19 11:20 – 12:40	Model predictive control

Reading Material: chapters from an electronic textbook will be available. Students will be expected to read this material. No additional textbooks are required.

Prerequisites: at least one course in linear algebra is required. A state-space feedback control course and an optimization course are desirable.

Organizer

Prof. Davide M. Raimondo

Ph.D. Coordinators

Prof. Paolo Di Barba
Prof. Guido Torelli

The course will be taught in English
For more information: davide.raimondo@unipv.it