



University of Pavia

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

PhD Course on The LMI/BMI Approach to Optimal Control

Prof. Richard D. Braatz

Massachusetts Institute of Technology

September 14 – 16, 2015, Aula Seminari ex Elettronica (piano D)
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
14/09/15 10:00 – 11:20	Brief review of matrix theory (fields, vector spaces, eigenvalues, eigenvectors, norms, quadratic and Hermitian forms, singular value decomposition)
14/09/15 11:20 – 12:40	Linear matrix inequalities, constraints, stability of linear and linear time-varying systems, Schur Complement Lemma
14/09/15 14:00 – 15:20	Computational complexity, convexity, ellipsoids, S-procedure, stability of uncertain systems
15/09/15 09:00 – 10:20	Bilinear matrix inequalities, optimizations with matrix inequality constraints
15/09/15 10:20 – 11:40	Stability margins, decay rate, process gains, performance margins
15/09/15 11:40 – 13:00	State feedback control analysis and design
16/09/15 09:00 – 10:20	State estimation, output estimation, estimation-based fault detection and diagnosis
16/09/15 10:20 – 11:40	Estimator-based output feedback design
16/09/15 11:40 – 13:00	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. Franco Maloberti

The course will be taught in English
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