Title of the Short Course

"State of the Art Computational Methods and Software for Numerical Linear Algebra Problems in Linear Control Systems "

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Objective: This short course is designed to give a complete overview of of the state-of-the-art computational methods and the associated software for numerical linear algebra problems arising in control systems design and analysis.

Abstract: The short course will present lectures on the state-of-the-art computational methods and software on important linear algebra problems arising in design and analysis of linear control systems. The lectures will be organized to clearly explain the algorithms in a manner that is suitable for easy implementations, the important aspects of computer implementations will be clearly discussed, a clear and concise comparative study of one algorithms over the others for a given problem will be presented.
The course will be of interests to the graduate students, researchers and engineers working on numerical linear algebra, computational and applied mathematics, control theory, vibration, aerospace and structural engineering. The course will also help the instructors design graduate level topic courses in numerical linear algebra and computational and applied mathematics and control engineering. *No prior knowledge of control theory will be assumed. However, a first course on matrix computations and software will be helpful*".

A TENTATIVE SCHEDULE

"State of the Art Computational Methods and Software for Numerical Linear Algebra Problems in Linear Control Systems". .

Presented by: *Biswa Datta*

9:00-10:00	Introduction. Basic Concepts: Modeling; System Responses; Controllability, Observability and Distance to uncontrollability; Stability, Robust Stability and Distance to Instability.
10:00-10:30	COFFEE BREAK
10:30-11:30	Feedback Stabilization (LQR Design), Numerical Methods and Conditions for Lyapunov, Sylvester and Algebraic Riccati Eq (and possibly H-Infinity Control).
11:30-12:30	Numerical Methods and Conditioning of Pole Placement, Algorithms for Observer Design, Kalman Filter, and LQG Design.
12:30-2:00	LUNCH
2:00-3:00	Model Reduction and Hankel Norm Approximation
300-3:30	COFFEE BREAK
3:30-4:15	System Identification
4:15-5:00	Control Software
5:00-5:30	Discussions