

**Lecture Schedule for the GIAN course (16IWT05)**  
**Singular Optimal Control and Dissipation Inequalities**  
**December 06–20, 2016**  
**Venue: Studio–3 (CET), Takshashila**  
**IIT Kharagpur**

Date	Lecture
<b>December 06, 2016</b> 9:00 - 9:45 AM 10:00 - 11:00 AM 11:00 - 11:15 AM 11:15 AM - 12:15 Noon 3:00-4:00 PM 4:00-4:15 PM	<b>Inauguration Ceremony</b> Introduction and course overview TEA -Break Linear operators and polynomials. Representations of the matrix exponential Lyapunov equations, stability and exponential growth TEA -Break
<b>December 07, 2016</b> 9:00 - 10:00 AM 10:15 – 11:15 AM 11:15 - 11:30 AM 3:00 - 4:00 PM 4:00 - 4:15 PM	Introduction to descriptor systems and differential algebraic equations (DAE), Canonical forms of matrix polynomials and matrix pencils TEA -Break Linear DAE of higher order TEA -Break
<b>December 08, 2016</b> 9:00 - 10:00 AM 10:15 – 11:15 AM 11:15 - 11:30 AM 3:00 - 4:00 PM 4:00 - 4:15 PM	Controllability and stabilization I Controllability and stabilization II TEA -Break Problem solving with examples TEA -Break
<b>December 09, 2016</b> 10:00 – 11:00 AM 11:15 - 11:30 AM 3:00 - 4:00 PM 4:00 - 4:15 PM	The singular value decomposition and applications TEA -Break Examination on the above discussed topics TEA -Break

Date	Lecture
<b>December 12, 2016</b> 11:15 - 11:30 AM 11:30 AM - 12:30 Noon  4:00 - 4:15 PM 4:15 – 5:15 PM 5:30 – 6:30 PM	TEA -Break The linear quadratic regulator problem I  TEA -Break The linear quadratic regulator problem II Problem solving with examples
<b>December 13, 2016</b> 11:15 - 11:30 AM 11:30 AM - 12:30 Noon  4:00 - 4:15 PM 4:15 – 5:15 PM 5:30 – 6:30 PM	TEA -Break Riccati equations – I  TEA -Break Riccati equations – II Problem solving with examples
<b>December 14, 2016</b> 11:15 - 11:30 AM 11:30 AM - 12:30 Noon  4:00 - 4:15 PM 4:15 – 5:15 PM 5:30 – 6:30 PM	TEA -Break The KYP-lemma and its special cases  TEA -Break Proofs of the KYP-lemma I Proofs of the KYP-lemma II
<b>December 15, 2016</b> 11:15 - 11:30 AM 11:30 AM - 12:30 Noon  4:00 - 4:15 PM 4:15 – 5:15 PM 5:30 – 6:30 PM	TEA -Break Linear matrix inequalities (LMI)  TEA -Break Some distance problems (distance to instability, uncontrollability etc.). Perturbation of eigenvalues and invariant subspaces.
<b>December 16, 2016</b> 11:15 - 11:30 AM 11:30 AM - 12:30 Noon  4:00 - 4:15 PM 4:15 – 5:15 PM 5:15 – 6:15 PM	TEA -Break Introduction to pseudospectra  TEA -Break Questions and answers session Questions and answers session
<b>December 19, 2016</b> 11:15 - 11:30 AM 11:30 AM - 12:30 Noon  4:00 - 4:15 PM 4:15 – 5:15 PM	TEA -Break Final Exam for the Course  TEA-Break Answer copy distribution
<b>December 20, 2016</b> 11:15 AM - 12:15 AM	<b>Valedictory Program and Certificate Distribution</b>