

INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI
PROFORMA FOR NEW COURSE

1.	Title of the Course	Linear Dynamical Systems
2.	Course Number	EE5102
3.	Status of the Course	Elective
4.	Structure of Credits	3-0-0-3
5.	Offered to	PG
6.	New Course/ Modification to	New Course
7.	To be offered by	Dr. P S Saikrishna
8.	To take effect from	July 2018
9.	Prerequisite	Control Engineering and Engineering Mathematics
10.	Whether approved by the Program	Yes
11.	<p>Course Objective: (Max 70 words)</p> <p>The aim of this course is to introduce state-space techniques for analysis of linear system models. This course forms the prerequisite for all advanced control courses.</p>	
12.	<p>Course Content: (Max 100 words)</p> <p>Models of physical systems ;Equilibrium/operating points, Jacobian linearization; Relative degree, diffeomorphism, input/output linearization of nonlinear systems; Minimal realization, Smith-McMillan form; Continuous-time linear time-varying/time-invariant (LTV/LTI) state-space models, Peono-Baker series, matrix exponentials, similarity transformations, Jordan normal form, algebraic and geometric multiplicity, minimal polynomial; Reachable and controllable subspaces, Controllability and observability Gramians, Kalman and Popov-Belevitch-Hautus (PBH) test for controllability and observability, Controllable and observable canonical forms; Stabilizability and detectability, Kalman canonical decomposition, Review of matrix theory--matrix norms, positive/negative definiteness ; Lyapunov stability, Lyapunov equation, Eigenvalue conditions for Lyapunov stability, Separation principle, pole-placement and observer design; Linear optimal control techniques, Linear quadratic regulator (LQR), the algebraic Riccati equation.</p>	
13.	<p>Text Book:</p> <p>1. Joao P H, <i>Linear Systems Theory</i>, Princeton University Press, New Jersey, 2009.</p>	
14.	<p>References:</p> <p>1. Chen C T, <i>Linear System Theory and Design</i>, Third Edition, Oxford University Press.</p> <p>2. Panos J A and Anthony N M, <i>Linear Systems</i>, Birkhauser, New York, 1997.</p> <p>3. Brockett R W, <i>Finite Dimensional Linear Systems</i>, John Wiley and Sons, New York, 1970.</p>	