LINEAR DYNAMICAL SYSTEMS

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PRE-REQUISITES : UG control systems, basics of linear algebra

INTENDED AUDIENCE : UG, PG Students and Industry Personnel.

INDUSTRIES APPLICABLE TO : Robert Bosch, ABB automation, Chemical process industry, Robotics/Mechatronics (e.g. ABB), Automation Sector (e.g. Honeywell Automation, Robert Bosch Ltd.), Process Industries (e.g. ACC Ltd.)

COURSE OUTLINE :

Linear system is the cornerstone of control theory and a prerequisite subject for almost all advanced level graduate courses in this area. The aim of this course is to take a beginning student, with some prior exposure to elementary transform and linear algebra, through a motivated and integrated development of the fuller perspective of the linear system theory. This course will also strengthen the basic logical arguments behind mathematical proofs.

ABOUT INSTRUCTOR :

Prof. Tushar Jain received the degree of Doctor in Control, Identification and Diagnostic from the Universite de Lorraine, Nancy, France in 2012. He previously received the degree of M.Tech. in System modeling and control from Indian Institute of Technology (IIT) Roorkee in 2009. From 2013 to 2014 and 2014 to 2015, he was a Post-doc researcher and Academy of Finland researcher respectively in the Research Group of Process Control at Aalto University, Finland. Since 2015, he is with the School of Computing and Electrical Engineering, IIT Mandi. During these last years, his research interest has been mainly concentrated on fault tolerant control, fault diagnosis and control for energy-efficient utilisation of renewable energy systems. He has received twice the best paper award for his research work. He has authored a book entitled Active Fault-Tolerant Control Systems: A Behavioral System Theoretic Perspective. He is a senior member of the Institute of Electrical and Electronics Engineers (IEEE).

COURSE PLAN :

Week 1**:** State-space solutions and realizations

Week 2**:** Stability

Week 3**:** Controllability: Part I

Week 4**:** Controllability: Part II

Week 5**:** State Feedback Controller Design: Part I

Week 6**:** State Feedback Controller Design: Part II

Week 7**:** Observability and minimal realization

Week 8**:** Observer Design and Output Feedback