

## SC 625 - Systems Theory

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### Course Outline:

**Basics of linear theory/linear algebra:** Vector spaces, Dimension, Basis, Subspaces, Dual spaces, Annihilators, Direct sum, Linear transformations, Matrix representations, Similarity, Rank and nullity.

**A primer on linear systems:** State-space models, Transition matrix properties, Minimal realization, Controllability, Observability.

**Optional Topics (time permitting):** Internal Stability, Lyapunov Stability theorems for linear systems, Linear Feedback and Observers, Separation Principle.

### References:

*Finite Dimensional Vector Spaces* - P. Halmos, Springer, 1984

*Linear System Theory* - Wilson J. Rugh, Prentice Hall, 2<sup>nd</sup> Edition, 1995

*Linear System Theory and Design* - C. T. Chen, Oxford University Press, 2<sup>nd</sup> Editions, 1995

*Linear Systems* - Thomas Kailath, Prentice-Hall, Inc.; 1<sup>st</sup> Edition, 1980

### Evaluation Policy:

Quiz (4 Nos.) - 40%

Homework Assignments (Special grades on unique solution) - 10%

Final Exam - 50%