

LINEAR SYSTEMS THEORY II

METU EE502 - SPRING 2022

Instructor: Emre Tuna

Web: <http://users.metu.edu.tr/etuna/ee502/>

Scope: This course provides an introduction to linear systems theory covering basic concepts such as system representation, stability, controllability, observability, state feedback, state estimation, and realization.

Textbook: J.P. Hespanha. *Linear Systems Theory*. Princeton Press, 2009.

Prerequisite: EE501 or equivalent.

Grading: There will be two midterm exams and one final exam.

Course outline	Text
1. System Representation a) State-space linear systems b) Linearization c) Transfer function	Ch. 1-4
2. System Solution a) Solutions to LTV systems b) Solutions to LTI systems c) Solutions to LTI systems: Jordan form	Ch. 5-7
4. Stability a) Lyapunov stability b) Input-output stability	Ch. 8-9
5. Controllability and State Feedback a) Controllable and reachable subspaces b) Controllable systems c) Controllable decompositions d) Stabilizability	Ch. 11-14
6. Observability and Output Feedback a) Observability b) Output feedback c) Minimal realizations	Ch. 15-17