

Linear Systems II (55:043)
(Required: Electrical and Information Engineering Tracks)

Catalog Description:

Continuation of 055:040, emphasis on Laplace and Z-transform analysis; unilateral and bilateral Laplace transform; region of convergence; stability; block diagram algebra; first- and second-order continuous and discrete time systems; Bode plots.

Pre(co)requisites:

55:040 [P]

Textbook:

A. V. Oppenheim and A. S. Willsky, *Signals and Systems*, 2nd. Edition, Prentice Hall, 1996

References:

None

Topics (Classes):

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| 1. Review of Discrete and Continuous time Fourier Series and Transform (6 classes) | 7. Amplitude Modulation (4 classes) |
| 2. Ideal Filters, group delay (2 classes) | 8. Laplace transform, properties and applications (6 classes) |
| 3. First and second order systems time response (3 classes) | 9. z- transform, properties and applications (6 classes) |
| 4. Bode plots of first and second order systems (3 classes) | 10. Block diagram algebra (2 classes) |
| 5. Sampling theorem, aliasing (4 classes) | 11. Stability of LTI systems (3 classes) |
| 6. Discrete time processing of continuous time signals (3 classes) | 12. Examinations (2 classes) |

Laboratory Projects:

None

Class/Laboratory Schedule:

None

Writing Assignments and Oral Presentations:

None

Design Component:

None

Contribution to the Requirements of Criterion 5:

Engineering topics: 2 s.h., Mathematics and Basic Sciences: 1 s.h.

Course Goals: Basis for Assessment and Mapping onto Outcomes

Course Goal	Basis For Goal Assessment	Supports ABET Outcomes
1. Understanding of bilateral and unilateral Laplace transforms and region of convergence.	Homework, quizzes, exam questions	a(●), e(●), j(●), k(●)
2. Understanding of bilateral and unilateral z- transforms and region of convergence.	Homework, quizzes, exam questions	a(●), e(●), j(●), k(●)
3. Understanding how to apply Laplace transform to the analysis of continuous time systems.	Homework, quizzes, exam questions	a(●), c(●), e(●), j(●), k(●)
4. Understanding how to apply z- transform to the analysis of discrete time systems	Homework, quizzes, exam questions	a(●), c(●), e(●), j(●), k(●)
5. Understanding of stability and how to assess stability of linear time invariant systems.	Homework, quizzes, exam questions	a(●), e(●), j(●), k(●)
6. Understanding of block diagrams.	Homework, quizzes, exam questions	a(●), e(●), j(●), k(●)
7. Understanding of time and frequency responses of first and second order systems.	Homework, quizzes, exam questions	a(●), e(●), j(●), k(●)
8. Familiar with Bode plots.	Homework, quizzes, exam questions	a(●), e(●), j(●), k(●)
9. They will reinforce the theoretical knowledge acquired in Lectures by Matlab assignments.	Homework, quizzes, exam questions	a(●), b(●), c(●), k(●)

◦ denote moderate contribution to the outcome; ● denote substantial contribution to the outcome

Performance Criteria:

Instructor completes a Course Outcome Rating (COR) that quantitatively evaluates student performance for each course goal-related outcome using a standard scale (4.0 = outstanding ability; 3.0 = good ability; 2.0 = adequate ability; 1.0 = poor ability; 0.0 = no ability). Instructor chooses appropriate graded course artifacts (homework questions, exam questions, etc) for each outcome rating. COR scores below 2.5 are indicative of problems with meeting course goals/outcomes and COR scores below 2.0 indicate failure to adequately meet course goals/outcomes.

Prepared By:

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