ECE673-851 Syllabus (Fall 2024)

Course Information

Course Number: ECE673 851 (online)

Course Title: Random Signal Analysis

Prerequisites

Undergraduate level: Linear System Theory and Random Signal Theory

Faculty Contact Information

Instructor: Dr. Tariq Elkourdi
Email: tariq.elkourdi@njit.edu
Office Hours: Fridays, 6-7 pm ET

Course Description

Fundamentals of random variables, introduction to random signals, and simulation of random phenomena. Topics include random variables and their key characteristics, sequences of random variables, central limit theorem, properties of random processes, correlation and spectral analysis, linear systems with random inputs, and prediction of random signals.

Textbook and Materials

Kay, S. (2006). ***Intuitive Probability and Random Processes using MATLAB***. New York: Springer. ISBN 978-0387241579.

Course Outcomes

1. Apply the fundamental concepts and methods of probability and random signals to develop an awareness of the key models and their interrelationships.
2. Develop problem solving skills and understand how to make the transition from a real-world problem to a random/probabilistic model.

3. Design and analyze random discrete-time and continuous-time signals and systems.
4. Perform frequency domain analysis on random signals and systems.
5. Design linear filters operating on random signals.
6. Use measurement data to formulate models for random signals and systems.
7. Design a variety of computer-based components, programs and systems for applications including signal processing, communications, computer networks, and control systems.

Grading Categories

Categories	**Percentage**
Assignments and projects	30%
Midterm Exam	30%
Final Exam	40%

Grading Scale

Grade	Percentile
A	9-10
B+	8-9
B	7-8
C+	6-7
C	5-6

Course Structure

Module Number	**Readings**	**Assignment Due Dates**	**Points**
1	Appendix 2A (pgs. 31-34), Chap. 2 (pgs. 17-19, 21)	9/8/2024	10
2	Chap. 5 (pgs. 111-113), Chap. 6 (pgs. 137, 139), Chap. 6 (pgs. 140-141), Chap. 6 (pgs. 143-146), Chap. 6 (pgs. 147-149, 152), Chap. 6 (pgs. 153-155)	9/15/2024	10
3	Chap. 10 (pgs. 293-295), Chap. 10 (pgs. 295-297), Chap. 10 (pgs. 303-306, 310), Chap. 10 (pgs. 313-316), Chap. 10 (pgs. 324), Chap. 10 (pgs. 324-325), Chap. 11 (pgs. 345-352, 354-355), Chap. 11 (pgs. 355-357), Chap. 11 (pgs. 359-361), Chap. 11 (pgs. 361-363), Chap. 11 (pgs. 363-364)	9/22/2024	10

4	Chap. 12 (pgs. 385-389, 391-394), Chap. 12 (pgs. 394, 396-397, 400-401, 403-404), Chap. 12 (pgs. 404-408), Chap. 12 (pg. 412), Chap. 12 (pgs. 414-415), Chap. 12 (pgs. 415, 417-418), Chap. 13 (pgs. 438-439, 446-447)	9/29/2024	10
5	Chap. 14 (pgs. 458-459, 461-462), Chap. 14 (pgs. 465-466), Chap. 14 (pgs. 467-468, 470), Chap. 14 (pgs. 475-476), Chap. 15 (pgs. 491, 497, 499)	10/6/2024	10
6	Chap. 9 (pgs. 272-277)	10/13/2024	10
7 (Midterm)	-	10/14/2024 - 10/20/2024	100
8	Chap. 16 (pgs. 520-526, 528-531), Chap. 16 (pgs. 533-536), Chap. 17 (pgs. 549-555, 557)	10/27/2024	10
9	Chap. 17 (pgs. 562-564, 566), Chap. 17 (pgs. 567-569, 571-575), Chap. 17 (pgs. 580-585)	11/3/2024	10
10	Chap. 18 (pgs. 599-600, 602-606), Chap. 18 (pgs. 623-626), Chap. 17 (pgs. 576-577, 579)	11/10/2024	10
11	Chap. 18 (pgs. 626-630)	11/17/2024	10
12	Chap. 19 (pgs. 642-647), Chap. 19 (pgs. 647-648, 650-652), Chap. 19 (pgs. 652-656), Chap. 19 (pgs. 657-658), Chap. 19 (pgs. 661-662)	11/24/2024	10
13	Chap. 20 (pgs. 673, 676-678), Chap. 20 (pgs. 681-686), Chap. 20 (pgs. 687-689)	12/1/2024	10
14	Chap. 18 (pgs. 609-611), Chap. 18 (pgs. 612-617)	12/8/2024	10
15 (Final)	-	12/15/2024 - 12/21/2024	100