Syllabus for ECE 673: Random Signal Analysis (online), Fall 2025

Prerequisites

Undergraduate level: Linear Systems Theory and Random Signal Theory

Faculty Contact Information

Instructor: Dr. Anirudh Sridhar
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Office Hours: Fridays, 3-4pm EST on zoom (link available on Canvas)

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

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

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

Breakdown: Assignments (30%), Midterm Exam (30%), Final Exam (30%)
Late work: No late assignments will be accepted, and no make-up exams will be administered.

Grade	Percentage
A	90-100%
B+	80-90%
B	70-80%
C+	60-70%
C	50-60%

Course Structure

Module	Readings	Assignment due date	Points
1	Appendix 2A (pgs. 31-34), Chap. 2 (pgs. 17-19, 21)	9/7/25	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)	9/14/25	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)	9/21/25	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)	9/28/25	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)	10/5/25	10
6	Chap. 9 (pgs. 272-277)	10/12/25	10
7 (Midterm)	None	10/13/25 -- 10/17/25	100

Module	Readings	Assignment due date	Points
8	Chap. 16 (pgs. 520-526, 528-531), Chap. 16 (pgs. 533-536), Chap. 17 (pgs. 549-555, 557)	10/26/25	10
9	Chap. 17 (pgs. 562-564, 566), Chap. 17 (pgs. 567-569, 571-575), Chap. 17 (pgs. 580-585)	11/2/25	10
10	Chap. 18 (pgs. 599-600, 602-606), Chap. 18 (pgs. 623-626), Chap. 17 (pgs. 576-577, 579)	11/9/25	10
11	Chap. 18 (pgs. 626-630)	11/16/25	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)	11/23/25	10
13	Chap. 20 (pgs. 673, 676-678), Chap. 20 (pgs. 681-686), Chap. 20 (pgs. 687-689)	11/30/25	10
14	Chap. 18 (pgs. 609-611), Chap. 18 (pgs. 612-617)	12/7/25	10
15 (Final exam)	None	12/15/25 -- 12/19/25	100

Student Conduct

All students must adhere to the NJIT University Policy on Academic Integrity.

Disability accomodations

NJIT adheres to section 504 of the Rehabilitation Act (ADA) of 1990. Appropriate accommodations are provided at no cost to the student. If you have any questions or would like additional information, please contact Dr. Phyllis Bolling, Center for Counseling and Psychological Services (C-CAPS), Campbell Hall, (entry level), room 205, (973) 596-3420 . For further information, visit the Student Disability Services. website.

Technical Support

For assistance with technical items such as UCID, Library database access, Webmail by Google email system, and Password assistance, please contact NJIT IST Service Desk at: 1-973-596-2900 or https://ist.njit.edu/servicedesk/.