SPRING 2026 : ELEC 8420 : Detection And Estimation Theory
T Th 9:30 am – 10:45 am Broun 306

Instructor: Prof. J.K. Tugnait 313 Broun, 4-1846, tugnajk@auburn.edu
Office Hours: By appointment; please email.

Prerequisite: ELEC 7410, or equivalent, or permission of the instructor.

Prerequisites by topic:

1. Probability, random variables, and random processes.
2. Elementary linear and matrix algebra.
3. Linear system theory

Course Goals:

1. To provide a solid theoretical background in estimation of random and nonrandom signals corrupted by noise.
2. To provide a solid theoretical background in detection of random and nonrandom signals corrupted by noise.
3. To prepare the student for graduate research and industrial work in the areas of communications, radar, sonar, signal processing, pattern recognition and stochastic control.

Textbook: B.C. Levy, *Principles of Signal Detection and Parameter Estimation*, Springer 2008.

Refs.: H.L. Van Trees, *Detection, Estimation And Modulation Theory, Part I*, Wiley, 1968.
M.D. Srinath, P.K. Rajasekaran & R. Viswanathan, *Introduction to Statistical Signal Processing with Applications*, Prentice-Hall, 1996.
H.V. Poor, *An Introduction To Signal Detection And Estimation*, 2nd ed., Springer, 1996.

Grading Basis:

Homework :	30 %	
Midterm (take-home):	30 %	(Out **Feb. 26, 2026**, In **March 3, 2026**)
Final (take-home):	40 %	(Out **April 23, 2026**, In **April 27, 2026**)

TEXT COVERAGE

- Detection: Chapters 2, 5, 7, 8, 9.
- Estimation: Chapter 4 + notes

ELEC 8420. Detection And Estimation Theory (3). Lec. 3. Pr., ELEC 7410. Decision theory concepts: Bayesian, maximum likelihood, minimax and Neyman-Pearson approaches to hypothesis testing; Detection of deterministic and random signals in noise; Parameter estimation: Bayesian and maximum likelihood approaches, nonrandom and random parameter estimation; Signal estimation.