

Sabancı University
Faculty of Engineering and Natural Sciences
EE 568 - Detection and Estimation

Fall 2021-2022
Course Information

Lecturer	: Hüseyin Özkan, hozkan@sabanciuniv.edu Room: FENS 1107, Phone: x9594.
Textbook	: H. Vincent Poor, An Introduction to Signal Detection and Estimation (Second Edition), Springer, 2013. In addition: Prof. Sinan Gezici's lecture notes based on this book.
Lecture Hours	: Monday 16:40-17:30, Thursday 09:40-11:30 (online via zoom).
Office Hours	: By appointment (please drop me an email to arrange one).
Course Objectives	: To provide students the fundamentals of detection and estimation theory and a grasp of the recent developments in research.
Prerequisite	: Multivariate probability theory (EE 550 Random Processes or equivalence)
Grading Policy	: Midterm 1, 20 %; Midterm 2, 20 %; Final 25 %; Assignments, 20%; Paper presentations, 15%.

Topics and Schedule (tentative):

- Chapter 1: Introduction to detection and estimation (**4 weeks**)
 - Bayesian, minimax, Neyman-Pearson and composite hypothesis testing
 - Uniformly most powerful test and generalized likelihood ratio test (GLRT)
- Chapter 2: Detection in discrete time (**4 weeks**)
 - Deterministic signals and independent noise
 - Deterministic signals and Gaussian noise
 - Detection of signals with random parameters
 - Detection of stochastic signals
 - Selected topics: Change detection, sequential detection, CFAR and GLRT
- Chapter 3: Estimation (**4 weeks**)
 - Bayesian approach: MMSE, MMAE, MAP and extensions to vector parameters
 - Nonrandom approach: Sufficiency and MVUE
 - Estimator variance: ML Estimation
- Chapter 4: Paper presentations (**2 weeks**)