1.	Title of the course	Statistical Signal Processing
2.	Course number	EE513L
3.	Structure of credits	3-0-0-3
4.	Offered to	PG
5.	New course/modification to	Modification To EE5204/6
6.	To be offered by	Department of Electrical Engineering
7.	To take effect from	July 2022
8.	Prerequisite	Nil
9.	**Course Objective(s):** The objective of the course is to investigate how to estimate signals and parameters and detect events from the data. In many cases, one can determine the optimal esti-mator/detector or at least bound the performance of any estimator/detector using the techniques learned from this theory. Detection and estimation theory finds applica-tions in many areas such as communication, signal processing, and control.	
10.	**Course Content:** Non-Bayesian Estimation: Sufficient Statistic, Biased and unbiased estimator, Minimum variance unbiased estimator (MVUE), Cramer-Rao bound, Best Linear Unbiased Estimator (BLUE), Maximum likelihood, Efficient estimator; Bayesian Estimation: Minimum mean square-error (MMSE), Linear MMSE, Minimum probability of error (MAP) estimator; Binary hypothesis testing: Hypothesis testing, Bayes risk and Bayes decision rule, Likelihood Ratio, Mini-max Detector, Neyman Pearson based detector, receiver operating characteristics and its properties, energy detector, matched filter; Composite hypothesis testing: Universally Most Powerful (UMP) Test, Karlin Rubin Theorem, Generalized Likelihood Ratio Test (GLRT); Applications: System identification, Communication system.	
11.	**Textbook(s):** 1. Steven M Kay, *Fundamentals of Statistical Signal Processing, Volume I: Estimation Theory*, Prentice Hall (1993). 2. Steven M Kay, *Fundamentals of Statistical Signal Processing, Volume II: Detection Theory*, Prentice Hall (1998).	
12.	**Reference(s):** 1. Van Trees H L, *Detection, Estimation and Modulation Theory, Part I, Detection, Estimation and Linear modulation theory*, Wiley (2013). 2. Vincent Poor H, *An Introduction to Signal Detection and Estimation*, Springer (1968).	