Course Code	TKEE165221
Course Name	Statistical Signal Processing
Course Instructors	Indah Soesanti
Course Type	Elective
Course Classification	Engineering Topics
Credit / Contact Hour per Week	3 / 150 minutes per Week
Course Description	This course describes stastical signal processing methods, which cover : Preface and Scope, Statistical Properties of Signal, Statistical Signal Processing in Time Domain, Frequency, and Spatial Domain, First Order Statistical Signal Characteristics, Second Order Statistical Signal Characteristics, Detection Theorem and Estimation Theorem, PSI to Classification and Recognition, Principal Analysis and Discriminant Analysis Concept, Random Process to calculate random signals correlation, Detection Algorithm based on MAP and Bayes, Signal Detection algorithm in a noise based on matched filter, Estimation Algorithm based on Least Square Method, Estimation Theorem based on Maximum Likelihood and Wiener Filter method.
Prerequisites Courses	Engineering Mathematics, Probability and Statistics
Covered Student Outcome	**Fundamental and Engineering Knowledge (a)** **Development of Engineering Solution (b)**

Learning Outcome	1. Students are able to explain statistical signal processing algorithm in time, frequency, and spatial domain 2. Students are able to apply statistical signal processing method for problem solving 3. Students are able to identify and solve engineering problem using statistical signal processing 4. Students are able to design a system and analyze the system
Topic	1. Statistical Properties of Signal, Statistical Signal Processing in Time, Frequency and Spatial Domain. 2. Algorithm and Method based on First Order Statistical Signal Characteristics. 3. Algorithm and Method based on Second Order Statistical Signal Characteristics. 4. Algorithm and PSI method to classification and pattern recognition. 5. Principal Analysis and Discriminant Analysis Concept. 6. PSI Application in Signal Processing and Electronics System 7. Random Process to calculate random signal correlation. 8. Detection algorithm based on MAP and Bayes. 9. Signal detection algorithm in a noise based on matched filter. 10. Estimation Algorithm based on Least Square Method. 11. Estimation Theorem based on Maximum Likelihood Theorem. 12. Signal Estimation Theorem in a noise using Wienner Filter.
Direct Asessment	

Direct Asessment Plan	Measured Learning Outcome
Engineering Design Assignment – Creating Proof of Concept	LO2, LO4
Engineering Design Assignment – Presenting the solution	LO3
Mid Exam	LO1, LO2
Final Exam	LO3, LO4

Indirect Asessment	Questionnaire (EDOM)
References	[1] Trevor Hastie, Robert Tibshirani, Jerome Friedman, 2008, "The Elements of Statistical Learning: Data Mining, Inference, and Prediction", Springer. [2] Gonzalez, R.C., R.E. Woods, 2008, "Digital Image Processing, Third Edition", Pearson Prentice Hall, New Jersey. [3] Steven M. Kay, 1993," Fundamentals of Statistical Signal Processing:

	Estimation Theory", Prentice Hall International, Inc
	[4] Richard O.Duda ,Peter E.Hart and David G.Stork,"Pattern Classification".2001