



INSTITUT TEKNOLOGI SEPULUH NOPEMBER
FAKULTAS SAINS DAN ANALITIKA DATA
PROGRAM STUDI MAGISTER STATISTIKA
DEPARTEMEN STATISTIKA

**Kode
Dokumen**

REV-1

RENCANA PEMBELAJARAN SEMESTER

MATA KULIAH (MK)		KODE	Rumpun MK	BOBOT (sks)		SEMESTER	Tgl Penyusunan
Perancangan Kualitas Cerdas		SS255222	Analitika Data Bisnis Dan Industri	T=3	P=0	II	Agustus 2026
OTORISASI		Pengembang RPS		Koordinator RMK		Kepala PRODI	
		Prof. Dr. Drs. Muhammad Mashuri, M.T.		Dr. Muhammad Ahsan, S.Si.		Irhamah, S.Si, M.Si, Ph.D.	
Capaian Pembelajaran (CP) <i>Learning Outcome (LO)</i>	CPL-PRODI yang dibebankan pada MK						
	CPL-4 <i>PLO-4</i>	Mampu menganalisis dan mengintegrasikan Teori Statistika dalam merumuskan metode statistika yang inovatif untuk menyelesaikan permasalahan teoritis dan riil. <i>Able to analyze and integrate statistical theory to formulate innovative statistical methods for solving both theoretical and real-world problems.</i>					
	CPL-5 <i>PLO-5</i>	Mampu merancang, melaksanakan, dan mengevaluasi metodologi pengumpulan data terstruktur dan tidak terstruktur, serta modifikasi metode sampling dan pengumpulan data. <i>Able to design, implement, and evaluate methodologies for collecting both structured and unstructured data, including the modification of sampling and data-collection methods.</i>					
	CPL-6 <i>PLO-6</i>	Mampu mengintegrasikan perangkat komputasi modern untuk mengembangkan solusi statistik yang efisien, dengan mengevaluasi keandalan dan ketepatan hasil komputasi. <i>Able to integrate modern computing tools to develop efficient statistical solutions, while assessing the reliability and accuracy of computational results.</i>					
	CPL-7 <i>PLO-7</i>	Mampu menganalisis dan mengevaluasi teknik komputasi statistik untuk memecahkan permasalahan statistika yang kompleks berbasis data <i>Able to analyze and evaluate statistical computing techniques to address complex, data-driven statistical problems</i>					
	CPL-8 <i>PLO-8</i>	Mampu menganalisis dan mengevaluasi metode statistika untuk merumuskan solusi pada permasalahan teoritis dan riil dengan pendekatan multidisipliner <i>Able to analyze and evaluate statistical methodologies to formulate solutions for theoretical and real-world problems using a multidisciplinary approach.</i>					
	CPL-9 <i>PLO-9</i>	Mampu menganalisis dan mengevaluasi metode statistika berbasis komputasi atau analitik yang inovatif untuk mengatasi permasalahan riil di bidang bisnis, industri, ekonomi, finansial, sosial dan pembangunan berkelanjutan, lingkungan, kesehatan, serta mengevaluasi dampaknya terhadap pengambilan keputusan <i>Able to analyze and evaluate innovative computation- or analytics-based statistical methods to address real-world problems in business, industry, economics and finance, social and sustainable development, environment, and health, and to assess their impact on decision-making.</i>					

	<i>This course focuses on advanced design of experiments and quality planning based on statistical methods. Upon completing this course, students will develop the competency to analyze, evaluate, and design complex experimental strategies and quality optimization frameworks. The learning strategy encompasses an in-depth examination of quality planning conceptual frameworks, optimal experiment design based on the Taguchi method, as well as single-response and multi-response optimization analysis. Students play an active role in: (i) outlining and critiquing the conceptual frameworks of robust design; and (ii) integrating and validating optimization methods to comprehensively resolve process variation issues and enhance industrial system reliability.</i>					
Bahan Kajian: Materi Pembelajaran	Matematika, Teori Statistika, Pengumpulan Data, Deskripsi dan Eksplorasi, Komputasi dan Data Processing, Industri dan Bisnis <i>Mathematics, Statistical Theory, Data Collection, Description and Exploration, Computing and Data Processing, Industry and Business</i>					
Pustaka	Utama :					
	1. Balavendram, N., Quality by Design Taguchi Techniques for Industrial Experimentation. London : Prentice Hall Internasional.1995 2. Park, Sung H., Robust Design and analysis for Quality Engineering, Chapman Hall, 1996 3. Raghu N. Kacker (auth.), Khosrow Dehnad (eds.)-Quality Control, Robust Design, and the Taguchi Method. Springer US. 1990 4. Montgomery: Design and Analysis of Experiments, 6th Edition, 2008 5. Ranjit K Roy, A primer on the Taguchi method-Society of Manufacturing Engineers. 2010					
	Pendukung :					
Dosen Pengampu	Prof. Dr. Muhammad Mashuri, MT					
Matakuliah syarat						

Mg Ke-	Kemampuan akhir tiap tahapan belajar (Sub-CPMK)	Penilaian		Bentuk Pembelajaran, Metode Pembelajaran, Penugasan Mahasiswa, [Estimasi Waktu]		Materi Pembelajaran [Pustaka]	Bobot Penilaian (%)
		Indikator	Kriteria & Bentuk	Luring (<i>offline</i>)	Daring (<i>online</i>)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Dapat menjelaskan konsep dasar dalam Quality by Design dan desain eksperimen <i>Able to explain basic concepts of Quality by</i>	1. Dapat menjelaskan perbedaan off-line quality control & on- line quality control 2. Dapat menjelaskan kegunaan Metode Taguchi dalam dunia industri. 3. Dapat menjelaskan konsep loss function.	Tes Observasi Aktifitas di kelas <i>Test Observation Activities in class</i>	Ceramah interaktif Diskusi (CID) 150 menit <i>Interactive lectures Discussion (ILD) 150 Minutes</i>		- Konsep dasar Taguchi - Quality Loss Function (QLF) - Dasar-dasar dalam desain eksperimen (an overview)	5%/5%

Mg Ke-	Kemampuan akhir tiap tahapan belajar (Sub-CPMK)	Penilaian		Bentuk Pembelajaran, Metode Pembelajaran, Penugasan Mahasiswa, [Estimasi Waktu]		Materi Pembelajaran [Pustaka]	Bobot Penilaian (%)
		Indikator	Kriteria & Bentuk	Luring (offline)	Daring (online)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Design and experimental design	1. Able to explain the difference between off-line quality control and on-line quality control 2. Able to explain the advantages of the Taguchi Method in the industrial world. 3. Able to explain the concept of loss function.				• Taguchi basic concepts • Quality Loss Function (QLF) • Basics in experimental design (an overview)	
2	Dapat menerapkan Orthogonal Array standard dan mampu menggunakannya untuk membuat rancangan percobaan dalam metode Taguchi Able to apply the standard orthogonal array and be able to use it to create experimental designs in the Taguchi method	Dapat menggunakan OA standard 2 level dan 3 level untuk merancang suatu percobaan Able to use OA standard 2 levels and 3 levels to design an experiment	Tes Tugas 1 (Observasi) Aktifitas di kelas Test Task 1 (Observation Activities in class)	CID Active Learning (AL) 150 Menit ILD Active Learning (AL) 150 Minutes		Orthogonal Array I : • orthogonal array 2^n & 3^n • Tabel interaksi dan graph linear Orthogonal Array I: • Orthogonal array 2^n & 3^n 1. Interaction table and linear graph	15%/20%
3, 4	Dapat menerapkan Orthogonal Array tidak standard (modifikasi) dan mampu menggunakannya untuk membuat rancangan percobaan dalam metode Taguchi Able to apply non-standard Orthogonal Array (modification) and be able to use it to create experimental designs in the Taguchi	Dapat menggunakan OA tidak standard (modifikasi) Able to use non-standard OA (modification)	Tes & Observasi Aktifitas di kelas (TOA) Tests & Observation Activities in class (TOA)	CIDLS 300 Menit CIDLS 300 minutes		Special Design Techniques: • dummy level, • combination designs, • Branching design, • idle coloumn method Special Design Techniques: • dummy level,	10%/30%

Mg Ke-	Kemampuan akhir tiap tahapan belajar (Sub-CPMK)	Penilaian		Bentuk Pembelajaran, Metode Pembelajaran, Penugasan Mahasiswa, [Estimasi Waktu]		Materi Pembelajaran [Pustaka]	Bobot Penilaian (%)
		Indikator	Kriteria & Bentuk	Luring (offline)	Daring (online)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	method					- combination designs, - Branching design, Idle column method	
5	Dapat memahami konsep SN rasio dan jenis-jenisnya untuk menganalisis data eksperimen respon kontinu dalam metode Taguchi Able to understand the concept of SN ratio and their types to analyze continuous response experimental data in the Taguchi method	- Dapat menerapkan SN rasio pada data respon kontinu - Dapat menganalisis SN rasio dengan Analysis ANOVA respon kontinu. - Able to apply SN ratio in continuous response data - Able to analyze SN ratio with Analysis of ANOVA with continuous response.	TOA TOA	CIDLS 300 menit CIDLS 300 minutes		- Parameter design untuk data kontinu (Analisis rasio signal to noise) - ANOVA dan persen kontribusi - Confidence interval pada dugaan kondisi optimum - Percobaan Konfirmasi - Parameters design for continuous data (Signal to noise ratio analysis) - ANOVA and percent contribution - Confidence intervals at suspected optimum conditions Confirmation experiment	20%/50%
6, 7	Dapat menganalisis Optimasi melalui metode Taguchi. Memahami konsep SN rasio dan jenis-jenisnya untuk	- Dapat menggunakan SN rasio untuk data respon diskrit - Dapat menganalisis SN rasio dengan Analysis ANOVA pada data respon diskrit	TOA TOA	CIDLS 150 menit CIDLS		Parameter design & analisis ratio signal to noise/SN rasio untuk data diskrit:	10%/60%

Mg Ke-	Kemampuan akhir tiap tahapan belajar (Sub-CPMK)	Penilaian		Bentuk Pembelajaran, Metode Pembelajaran, Penugasan Mahasiswa, [Estimasi Waktu]		Materi Pembelajaran [Pustaka]	Bobot Penilaian (%)
		Indikator	Kriteria & Bentuk	Luring (offline)	Daring (online)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	menganalisis data eksperimen diskrit dalam metode Taguchi <i>Able to analyze optimization through Taguchi method. Understand the concept of SN ratio and their types to analyze discrete experimental data in the Taguchi method</i>	<i>Able to use SN ratio for discrete response data</i> <i>Able to analyze SN ratio with Analysis of ANOVA in discrete response data</i>		<i>150 minutes</i>		- Dua kelas data diskrit: Analisis SN rasio - Dua kelas data diskrit: 0/1 data direct analysis - Metode Omega - Multi-class discrete data: scoring method & accumulation analysis <i>Parameter design & ratio signal analysis to noise/SN ratio for discrete data:</i> <i>Two discrete data classes: SN ratio analysis</i> <i>Two discrete data classes: 0/1 data direct analysis</i> <i>Omega Methods Multi-class discrete data: scoring method & accumulation analysis</i>	
8	ETS	ETS	ETS	ETS		ETS	ETS
9	Dapat melakukan analisis data metode Taguchi	Dapat melakukan optimasi pada kasus multirespon	TOA Tugas-3	CIDLS 300 Menit		Optimasi multi respon secara simultan	10%/70%

Mg Ke-	Kemampuan akhir tiap tahapan belajar (Sub-CPMK)	Penilaian		Bentuk Pembelajaran, Metode Pembelajaran, Penugasan Mahasiswa, [Estimasi Waktu]		Materi Pembelajaran [Pustaka]	Bobot Penilaian (%)
		Indikator	Kriteria & Bentuk	Luring (<i>offline</i>)	Daring (<i>online</i>)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	untuk kasus multi respon <i>Able to perform data analysis of Taguchi method for multi-response cases</i>	<i>Able to perform optimization in multi response cases</i>	<i>TOA Task-3</i>	<i>CIDLS 300 Minutes</i>		dengan Metode TOPSIS <i>Simultaneous multi-response optimization with TOPSIS Method</i>	
10,11	Dapat menggunakan metode Respon Surface untuk optimasi pada respon tunggal <i>Able to use Surface Response method for optimization in a single response</i>	Dapat melakukan penyelesaian kasus optimasi melalui Response surface metodologi dan perannya dalam perbaikan kualitas (quality improvemet) <i>Able to solve optimization cases through response surface methodology and its role in quality improvement (quality improvement)</i>	TOA <i>TOA</i>	CIDLS 150 Menit <i>CIDLS 150 Minutes</i>	150 menit <i>150 minutes</i>	Response surface design and analysis: • <i>response surface modeling</i> • <i>analysis of a second order model</i> <i>Response surface design and analysis:</i> • <i>response surface modeling analysis of a second order model</i>	10%/80%
12,13	Dapat menggunakan metode Respon Surface untuk optimasi pada respon ganda <i>Able to use surface response method for optimization in multi responses</i>	Dapat melakukan penyelesaian kasus optimasi melalui Response surface metodologi untuk respon lebih dari satu. <i>Able to solve optimization cases through response surface methodology for more than one response.</i>	TOA <i>TOA</i>	DPS 600 Menit <i>DPS 600 Minutes</i>	600 menit <i>600 minutes</i>	<i>Desirability function</i> <i>Non-linear programming</i> <i>Desirability function</i> <i>Non-linear programming</i>	10%/90%
14,15	Robust design, cost improvement, and	Dapat mengoptimalkan biaya manufaktur, dan maksimalkan performa	TOA	DPS 300 Menit	300 menit	Robust design: a cost-effective method for	10%/100%

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		Indikator	Kriteria & Bentuk	Luring (<i>offline</i>)	Daring (<i>online</i>)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	maximizing system performance Robust design, cost improvement, and maximizing system performance	system Able to optimize manufacturing costs, and maximize system performance	TOA	DPS 300 minutes	300 minutes	Improving manufacturing processes Tuning computer systems for maximum Performance: a statistical approach Robust design: a cost-effective method for Improving manufacturing processes Tuning computer systems for maximum Performance: a statistical approach	