

MODULE HANDBOOK

REABILITY ANALYSIS



**STATISTICS UNDERGRADUATE PROGRAM
DEPARTMENT OF STATISTICS
FACULTY OF SCIENCE AND DATA ANALYTICS
INSTITUT TEKNOLOGI SEPULUH NOPEMBER
SURABAYA**

ENDORSEMENT PAGE



MODULE HANDBOOK REABILITY ANALYSIS STATISTICS UNDERGRADUATE PROGRAM DEPARTMENT OF STATISTICS INSTITUT TEKNOLOGI SEPULUH NOPEMBER

Proses <i>Process</i>	Penanggung Jawab <i>Person in Charge</i>			Tanggal <i>Date</i>
	Nama <i>Name</i>	Jabatan <i>Position</i>	Tanda tangan <i>Signature</i>	
Perumus <i>Preparation</i>	Dr. Hidayatul Khusna, S.Si.	Dosen Lecturer		
Pemeriksa dan Pengendalian <i>Review and Control</i>	Prof. Dr. Muhammad Mashuri, M.T.; Dr. Hidayatul Khusna, S.Si	Tim kurikulum Curriculum team		
Persetujuan <i>Approval</i>	Dr. Wibawati, S.Si., M.Si.	Koordinator RMK Course Cluster Coordinator		
Penetapan <i>Determination</i>	Dr. Kartika Fithriasari, M.Si	Kepala Departemen Head of Department		

MODULE HANDBOOK

REABILITY ANALYSIS

Module name	REABILITY ANALYSIS	
Module level	Undergraduate	
Code	SS234630	
Course (if applicable)	REABILITY ANALYSIS	
Semester	6	
Person responsible for the module	Dr. Hidayatul Khusna, S.Si.	
Lecturer	Prof. Dr. Muhammad Mashuri, M.T.; Dr. Hidayatul Khusna, S.Si.	
Language	Bahasa Indonesia and English	
Relation to curriculum	Undergraduate degree program, elective, 6th semester.	
Type of teaching, contact hours	SCL Method (93.75%) Non-SCL Method (6.25%)	
Workload	1. Lectures [L] : 3 x 50 = 150 minutes per week. 2. Exercises and Assignments [EA] : 3 x 60 = 180 minutes (3 hours) per week. 3. Independent learning [IL]: 3 x 60 = 180 minutes (3 hours)perweek.	
Credit points	3 credit points (SKS) Equivalent to 4.8 ECTS	
Requirements according to the examination regulations	A student must have attended at least 80% of the lectures to sit in the exams.	
Mandatory prerequisites	-	
Learning outcomes and their corresponding PLOs	<p>CLO.1 Able to describe the concept of reliability to determine the reliability of a component or system</p> <p>CLO2 Able to explain reliability, maintainability, and availability analysis procedures to determine the reliability of components or systems.</p> <p>CLO.3 Able to apply reliability models in the industry to analyze data</p> <p>CLO.4 Able to identify, formulate, and solve statistical problems in the field of reliability analysis</p> <p>CLO.5. Able to use modern computing techniques and computer equipment needed to solve reliability optimization problems</p> <p>CLO 6. Have knowledge of current and upcoming issues related to the field of reliability analysis</p>	<p>PLO-5</p> <p>PLO-7</p> <p>PLO-9</p> <p>PLO-10</p>

Content	Reliability is one of the courses in the industrial sector which has a field of study to determine the reliability of a tool. The purpose of studying reliability is to know the application of the Statistical method to determine the reliability and maintenance time of a tool and system, and to be able to perform reliability data analysis. The learning strategy used is discussion and practice as well as presentation assignments that come from scientific publications through journals, proceedings and others.
Assessment and its weight	Assignment (20%) Midterm Test (25%) Team-based Project (30%) Final Test (25%)
Media employed	LCD, whiteboard, websites (myITS Classroom), zoom
Reading list	<ol style="list-style-type: none"> 1. Dhillon, B. S., 2006. <i>Maintainability, maintenance, and reliability for engineers</i>. CRC Press Taylor dan Francis Group. 2. Ebeling, C., 2010. <i>An Introduction to Reliability and Maintainability Engineering</i>. 2nd edition. Canada : Waveland Press, Inc.



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

Kode Dokumen

RENCANA PEMBELAJARAN SEMESTER/
SEMESTER LEARNING PLAN

MATA KULIAH (MK)/ <i>Course</i>	KODE/ <i>Code</i>	Rumpun MK/ <i>Course Group</i>	BOBOT (sks)/ <i>Weight (credit)</i>		SEMESTER/ <i>Semester</i>	Tgl Penyusunan/ <i>Drafting Date</i>
ANALISIS RELIABILITAS / <i>REABILITY ANALYSIS</i>	SS234630	SBI	T=3	P=3	IV	17 Desember 2022
OTORISASI/ <i>AUTHORIZATION</i>	Pengembang RPS/ <i>RPS Developer</i>		Koordinator RMK/ <i>Course Group Coordinator</i>		Ketua PRODI/ <i>Head of Department</i>	
	Prof. Dr. Muhammad Mashuri, M.T.		Wibawati, S.Si, M.Si		Dr. Kartika Fithriasari, M.Si	
Capaian Pembelajaran (CP)/ <i>Learning Achievement</i>	CPL-PRODI yang dibebankan pada MK/ <i>PLO</i>					
	CPL-5	Mampu menerapkan teori statistika pada metode statistika				
	CPL-7	Mampu menggunakan perangkat komputasi modern untuk menyelesaikan permasalahan Statistik				
	CPL-9	Mampu menerapkan metode statistika untuk menganalisis permasalahan teoritis dan riil				
	CPL-10	Mampu menerapkan metode statistika Bisnis, Industri, Ekonomi, Sosial, Lingkungan atau Kesehatan pada permasalahan riil				
	<i>PLO-5</i>	<i>Able to apply statistical theory to statistical methods</i>				
	<i>PLO-7</i>	<i>Able to use modern computing devices to solve statistical problems</i>				
	<i>PLO-9</i>	<i>Able to apply statistical methods to analyze theoretical and real problems</i>				
	<i>PLO-10</i>	<i>Able to apply business, industrial, economic, social, environmental or health statistical methods to real problems</i>				
	Capaian Pembelajaran Mata Kuliah (CPMK)/ <i>CLO</i>					
	CPMK.1 Menjelaskan konsep reliabilitas untuk menentukan kehandalan komponen atau sistem					

	<p>CPMK.2 Mampu menjelaskan prosedur analisis reliabilitas, maintainabilitas dan availabilitas untuk menentukan kehandalan komponen atau sistem.</p> <p>CPMK.3 Mampu mengaplikasikan model reliabilitas dalam Industri untuk menganalisis data</p> <p>CPMK.4 Mampu mengidentifikasi, memformulasi, dan menyelesaikan masalah Statistika di bidang analisis reliabilitas</p> <p>CPMK.5 Mampu menggunakan teknik komputasi dan perangkat komputer modern yang diperlukan untuk menyelesaikan masalah optimasi reliabilitas</p> <p>CPMK.6 Memiliki pengetahuan tentang isu-isu saat ini dan yang akan datang terkait dengan bidang analisis reliabilitas</p> <p><i>CLO.1 Able to describe the concept of reliability to determine the reliability of a component or system</i></p> <p><i>CLO2 Able to explain reliability, maintainability, and availability analysis procedures to determine the reliability of components or systems.</i></p> <p><i>CLO.3 Able to apply reliability models in the industry to analyze data</i></p> <p><i>CLO.4 Able to identify, formulate, and solve statistical problems in the field of reliability analysis</i></p> <p><i>CLO.5. Able to use modern computing techniques and computer equipment needed to solve reliability optimization problems</i></p> <p><i>CLO 6. Have knowledge of current and upcoming issues related to the field of reliability analysis</i></p>																																			
	<p>Matrik CPL – CPMK <i>PLO-CLO Matrix</i></p> <table border="1" data-bbox="555 842 2027 1082"> <thead> <tr> <th>CPMK</th> <th>CPL-5</th> <th>CPL-7</th> <th>CPL-9</th> <th>CPL-10</th> </tr> </thead> <tbody> <tr> <td>CPMK-1</td> <td>V</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CPMK-2</td> <td>V</td> <td></td> <td></td> <td></td> </tr> <tr> <td>CPMK-3</td> <td>V</td> <td>V</td> <td>V</td> <td></td> </tr> <tr> <td>CPMK-4</td> <td></td> <td>V</td> <td>V</td> <td></td> </tr> <tr> <td>CPMK-5</td> <td></td> <td>V</td> <td>V</td> <td>V</td> </tr> <tr> <td>CPMK-6</td> <td></td> <td></td> <td></td> <td>V</td> </tr> </tbody> </table>	CPMK	CPL-5	CPL-7	CPL-9	CPL-10	CPMK-1	V				CPMK-2	V				CPMK-3	V	V	V		CPMK-4		V	V		CPMK-5		V	V	V	CPMK-6				V
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<p>Deskripsi Singkat MK/ Course Description</p>	<p>Reliabilitas merupakan salah satu mata kuliah di bidang industri yang mempunyai bidang kajian menentukan keterandalan suatu alat. Tujuan mempelajari Reliabilitas adalah untuk mengetahui penerapan metode Statistika untuk menentukan keterandalan dan waktu perawatan suatu alat dan sistem, serta mampu melakukan analisis data reliabilitas. Untuk mencapai ini maka Strategi pembelajaran yang digunakan adalah diskusi dan latihan serta tugas presentasi yang bersumber dari publikasi ilmiah lewat jurnal, prosiding dan lain-lain.</p> <p><i>Reliability is one of the courses in the industrial sector which has a field of study to determine the reliability of a tool. The purpose of studying reliability is to know the application of the Statistical method to determine the reliability and maintenance time of a tool and system, and to be able to perform reliability data analysis. The learning strategy used is discussion and practice as well as presentation assignments that come from scientific publications through journals, proceedings and others.</i></p>																																			

Bahan Kajian: Materi Pembelajaran/ Course Material	Dasar Sains, Teori Statistika, Pengumpulan Data, Deskripsi dan Eksplorasi, Komputasi dan Data Processing, Pemodelan, Industri dan Bisnis <i>Basic Design, Statistical Theory, Data Collection, Description and Exploration, Computing and Data Proceasing, Modeling, Industry and Business</i>						
Pustaka/ References	Utama/Primary:						
	Dhillon, B. S., 2006. <i>Maintainability, maintenance, and reliability for engineers</i> . CRC Press Taylor dan Francis Group.						
	Pendukung/Secondary:						
Ebeling, C., 2010. <i>An Introduction to Reliability and Maintainability Engineering</i> . 2nd edition. Canada : Waveland Press, Inc.							
Dosen Pengampu/ Lecturers	Prof. Dr. Muhammad Mashuri, M.T.; Dr. Hidayatul Khusna, S.Si.						
Matakuliah syarat/ Pre-requisite Course	Statistika Matematika <i>Mathematic Statistics</i>						
Mg Ke- Week	Kemampuan akhir tiap tahapan belajar (Sub-CPMK) Final capability for each learning step	Penilaian Evaluation		Bantuk Pembelajaran, Metode Pembelajaran, Penugasan Mahasiswa, [Estimasi Waktu]		Materi Pembelajaran [Pustaka] Learning Material [References]	Bobot Penilaian (%) Evaluation Weight (%)
		Indikator Indicator	Kriteria & Bentuk Criteria and Format	Luring Offline	Daring Online		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	1a. Memahami apa yang akan dipelajari dalam keseluruhan	1. Dapat memahami konsep-konsep dasar analisis reliabilitas.	Tes Observasi Aktifitas di kelas	TM: 1x3x50" LT: 1x3x60" BM: 1x3x60"		Dhillon, B. S., 2006. <i>Maintainability, maintenance, and</i>	10%/10%

	<p>kuliah</p> <p>1b. Memahami Konsep dasar analisis reliabilitas</p> <p>1c. Memahami konsep distribusi waktu kegagalan</p> <p><i>1a. Understand what will be studied in the entire lecture</i></p> <p><i>1b. Understand the basic concepts of reliability analysis</i></p> <p><i>1c. Understand the concept of failure time distribution</i></p>	<p>2. Dapat memahami konsep Distribusi waktu kegagalan (Failure distribution): fungsi reliability, Mean Time to Failure (MTTF), hazard rate function, Bathtub Curve, reliability bersyarat).</p> <p><i>1. Can understand the basic concepts of reliability analysis.</i></p> <p><i>2. Can understand the concept of Failure distribution: reliability function, Mean Time to Failure (MTTF), hazard rate function, bathtub curve, conditional reliability).</i></p>	<p><i>Task</i></p> <p><i>Classroom Activity</i></p> <p><i>Observation</i></p>	<p><i>L: 1x3x50"</i></p> <p><i>EA: 1x3x60"</i></p> <p><i>IL: 1x3x60"</i></p>		<p><i>reliability for engineers.</i></p> <p>CRC Press Taylor dan Francis Group.</p>	
2	<p>Memahami konsep Model laju kegagalan konstan.</p> <p><i>Understand the concept of constant failure rate model.</i></p>	<p>Memahami Model laju kegagalan konstan (Fungsi reliability eksponensial, model-model kegagalan (failure modes), distribusi eksponen sial dua parameter, proses poisson, redudansi dan CFR model).</p> <p><i>Understand constant failure rate models (exponential reliability function, failure modes, two-parameter exponential distribution, Poisson process,</i></p>	<p>Tes</p> <p>Tugas 1</p> <p>Observasi Aktifitas di kelas</p> <p><i>Task</i></p> <p><i>Assignment 1</i></p> <p><i>Classroom Activity</i></p> <p><i>Observation</i></p>	<p>TM:1x3x50"</p> <p>LT: 1x3x60"</p> <p>BM: 1x3x60"</p> <p><i>L: 1x3x50"</i></p> <p><i>EA: 1x3x60"</i></p> <p><i>IL: 1x3x60"</i></p>		<p>Dhillon, B. S., 2006. <i>Maintainability, maintenance, and reliability for engineers.</i> CRC Press Taylor dan Francis Group.</p>	10%/20%

		<i>redundancy and CFR model).</i>					
3,4	Memahami konsep Time-dependent failure models. <i>Understand the concept of time-dependent failure model</i>	Dapat menentukan parameter-parameter reliabilitas untuk Time-dependent failure models (Weibull, lognormal, Gamma). <i>Can determine reliability parameters for time-dependent failure models (Weibull, lognormal, Gamma).</i>	Tes Observasi Aktifitas di kelas <i>Task Classroom Activity Observation</i>	TM: 2x3x50" LT: 2x3x60" BM: 2x3x60" <i>L: 2x3x50" EA: 2x3x60" IL: 2x3x60</i>		Dhillon, B. S., 2006. <i>Maintainability, maintenance, and reliability for engineers.</i> CRC Press Taylor dan Francis Group.	10%/30%
5,6	Memahami konsep reliabilitas suatu system. <i>Understand the concept of system reliability.</i>	Dapat menentukan ukuran-ukuran reliabilitas suatu sistem. <i>Can determine the reliability measures of a system.</i>	Tes Observasi Aktifitas di kelas <i>Task Classroom Activity Observation</i>	TM: 2x3x50" LT: 2x3x60" BM: 2x3x60" <i>L: 2x3x50" EA: 2x3x60" IL: 2x3x60</i>		Dhillon, B. S., 2006. <i>Maintainability, maintenance, and reliability for engineers.</i> CRC Press Taylor dan Francis Group.	10%/40%
7	Memahami konsep Model Markov untuk reabilitas sistem yang dependent. <i>Understand the concept of the Markov Model for dependent system reliability.</i>	Dapat menentukan ukuran-ukuran reliabilitas suatu State-dependent system dengan analisis Markov. <i>Can determine the reliability measures of a State-dependent system with Markov analysis.</i>	TOA <i>TOA</i>	TM:1x3x50" LT: 1x3x60" BM: 1x3x60" <i>L: 1x3x50" EA: 1x3x60" IL: 1x3x60"</i>		Dhillon, B. S., 2006. <i>Maintainability, maintenance, and reliability for engineers.</i> CRC Press Taylor dan Francis Group.	10%/50%
8	ETS/Midterm						
9	Memahami konsep Maintainability. <i>Understand the concept of Maintainability.</i>	1. Dapat mengkarakterisasi dan mengkuatifikasi perbaikan (repair) suatu item yang gagal. 2. Dapat mengaplikasikan	TOA <i>TOA</i>	TM: 1x3x50" LT: 1x3x60" BM: 1x3x60" <i>L: 1x3x50" EA: 1x3x60"</i>		Dhillon, B. S., 2006. <i>Maintainability, maintenance, and reliability for engineers.</i> CRC Press Taylor dan Francis Group.	10%/60%

		Maintainability untuk proses desain. 1. <i>Can characterize and quantify the repair (repair) of a failed item.</i> 2. <i>Can apply Maintainability to the design process.</i>		<i>IL: 1x3x60"</i>			
10,11	Memahami konsep Availability. <i>Understand the concept of Availability.</i>	Dapat menentukan ukuran <i>performance</i> system dengan Availability. <i>Can determine the size of the performance system with Availability.</i>	TOA TOA	TM: 2x3x50" LT: 2x3x60" BM: 2x3x60" <i>L: 2x3x50"</i> <i>EA: 2x3x60"</i> <i>IL: 2x3x60"</i>		Dhillon, B. S., 2006. <i>Maintainability, maintenance, and reliability for engineers.</i> CRC Press Taylor dan Francis Group.	10%/70%
12,13	Memahami konsep Availability. <i>Understand the concept of Availability.</i>	Dapat menentukan perawatan. <i>Can determine treatment.</i>	TOA Tugas 2 TOA Assignment 2	TM: 2x3x50" LT: 2x3x60" BM: 2x3x60" <i>L: 2x3x50"</i> <i>EA: 2x3x60"</i> <i>IL: 2x3x60"</i>		Dhillon, B. S., 2006. <i>Maintainability, maintenance, and reliability for engineers.</i> CRC Press Taylor dan Francis Group.	15%/85%
14,15	Memahami konsep-konsep Analisis data kegagalan. <i>Understand the concepts of failure data analysis.</i>	Dapat menentukan menguji dan menentukan ukuran reliabilitas untuk data lengkap dan tersensor, non parametrik maupun parametrik. <i>Can determine test and determine reliability measures for complete and censored data, non-parametric and parametric.</i>	TOA TOA	TM: 2x3x50" LT: 2x3x60" BM: 2x3x60" <i>L: 2x3x50"</i> <i>EA: 2x3x60"</i> <i>IL: 2x3x60"</i>		Dhillon, B. S., 2006. <i>Maintainability, maintenance, and reliability for engineers.</i> CRC Press Taylor dan Francis Group.	15%/100%
16	Evaluasi Akhir Semester / Ujian Akhir Semester/ <i>Final Exam</i>						

