


MODULE HANDBOOK

INTRODUCTION TO TIME SERIES ANALYSIS



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

ENDORSEMENT PAGE

	<p>MODULE HANDBOOK INTRODUCTION TO TIME SERIES ANALYSIS STATISTICS UNDERGRADUATE PROGRAM DEPARTMENT OF STATISTICS INSTITUT TEKNOLOGI SEPULUH NOPEMBER</p>
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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>	Prof.Dr.rer.pol. Heri Kuswanto, S.Si., M.Si.	Dosen Lecturer		
Pemeriksa dan Pengendalian <i>Review and Control</i>	Dr. Muhammad Sjahid Akbar, M.Si; Dr.rer.pol Dedy Dwi P, M.Si; Prof. Dr. Heri Kuswanto; Irhamah, M.Si, Ph.D	Tim kurikulum Curriculum team		
Persetujuan <i>Approval</i>	Dr. Ir. Setiawan, MS	Koordinator RMK Course Cluster Coordinator		
Penetapan <i>Determination</i>	Dr. Kartika Fithriasari, M.Si	Kepala Departemen Head of Department		

MODULE HANDBOOK

INTRODUCTION TO TIME SERIES ANALYSIS

Module name	INTRODUCTION TO TIME SERIES ANALYSIS	
Module level	Undergraduate	
Code	SS234525	
Course (if applicable)	INTRODUCTION TO TIME SERIES ANALYSIS	
Semester	5	
Person responsible for the module	Prof.Dr.rer.pol. Heri Kuswanto, S.Si., M.Si.	
Lecturer	Dr. Muhammad Sjahid Akbar, M.Si; Dr.rer.pol Dedy Dwi P, M.Si; Prof. Dr. Heri Kuswanto; Irhamah, M.Si, Ph.D	
Language	Bahasa Indonesia and English	
Relation to curriculum	Undergraduate degree program, mandatory, 5th semester.	
Type of teaching, contact hours	Case Method (41,18%) Team Based Project (5,88%) Other SCL Methods (52,94%)	
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) per week.	
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 Explains the use of the concepts of Time Series Analysis which includes identification, parameter estimation, diagnostic checks, and forecasting</p> <p>CLO.2 Explains each stage of the model building procedure in Time Series Analysis on a real problem</p> <p>CLO.3 Able to apply Time Series Analysis to get the right forecast on a real problem</p> <p>CLO.4 Able to utilize applications and software to calculate statistical quantities for the formation of Time Series Analysis models</p> <p>CLO.5 Able to adapt to the situation at hand</p>	<p>PLO-1</p> <p>PLO-3</p> <p>PLO-4</p>

	<p>CLO.6 Able to make the right decisions based on forecast results from a time series model and able to communicate the results of the analysis both orally and in writing</p> <p>CLO.7 Able to communicate effectively and work together in interdisciplinary and multidisciplinary teams</p> <p>CLO.8 Have professional responsibilities and ethics</p> <p>CLO.9 Able to motivate yourself to think creatively and learn throughout life</p>	
Content	<p>Time series analysis is a proficiency course that is a part of the statistical modeling courses. The objectives in learning time series analysis are the students can understand the statistical concept in univariate time series (particularly in Exponential Smoothing, Time Series Regression, Decomposition, ARIMA), bivariate time series (particularly in Intervention Analysis, Outlier Detection, Calendar Variation Model, and Transfer Function with Single Input), and able to apply the methods in a real dataset. Through this course, the students are expected to have learning experiences with critical thinking and provide the appropriate decision relating to the suitable time series model on particular cases and its solution. The learning strategies used in this course are discussion, exercise, and assignment.</p>	
Assessment and its weight	<p>Assignment I – 25%</p> <p>Midterm Exam – 25%</p> <p>Assignment II – 20%</p> <p>Final Project – 30%</p>	
Media employed	<p>LCD, whiteboard, websites (myITS Classroom), zoom</p>	
Reading list	<ol style="list-style-type: none"> 1. Bowerman, B.L, O'Connell, R.T. and Koehler, A.B. 2005. Forecasting, Time Series, and Regression: An Applied Approach, 4th edition. USA: Duxbury Press. 2. Box, G.E.P., Jenkins, G.M., and Reinsel, D., 1994. Time Series Analysis: Forecasting and Control. 2nd edition. San Fransisco: Holden Day. 3. Cryer, J.D. and Chan, K-S., 2008. Time Series Analysis: with Application in R. Boston: PWS-KENT Publishing Company. 4. Hanke, J.E. and Wichern, D.W., 2008. Business Forecasting. 9th edition. Prentice Hall. 5. Wei, W.W.S., 2006. Time Series Analysis: Univariate and Multivariate Methods. USA: Addison-Wesley Publishing Co. 	



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>
PENGANTAR ANALISIS DERET WAKTU/ <i>INTRODUCTION TO TIME SERIES ANALYSIS</i>	SS234525	ANDEF	T=	P=	V	11 Januari 2023
OTORISASI/ <i>AUTHORIZATION</i>	Pengembang RPS/ <i>RPS Developer</i>		Koordinator RMK/ <i>Course Group Coordinator</i>		Ketua PRODI/ <i>Head of Department</i>	
	Dr. Muhammad Sjahid Akbar, M.Si		Dr. Ir. Setiawan, MS		Dr. Kartika Fithriasari, M.Si	
Capaian Pembelajaran (CP)/ <i>Learning Achievement</i>	CPL-PRODI yang dibebankan pada MK/ <i>PLO</i>					
	CPL-1 CPL-3 CPL-4	Mampu menerapkan pengetahuan teori statistika, matematika, dan komputasi Mampu menganalisis data dengan metode statistika yang tepat dan menginterpretasikannya				
	<i>PLO-1</i> <i>PLO-3</i> <i>PLO-4</i>	Mampu mengidentifikasi, memformulasi, dan menyelesaikan masalah statistika di berbagai bidang terapan <i>Able to apply statistical, mathematical, and computational theory knowledge</i> <i>Able to analyze data with the right statistical methods and interpret it</i> <i>Able to identify, formulate, and solve statistical problems in various applied fields</i>				
	Capaian Pembelajaran Mata Kuliah (CPMK)/ <i>CLO</i>					

	<p>CPMK.1 Menjelaskan penggunaan konsep-konsep Analisis Deret Waktu yang meliputi identifikasi, estimasi parameter, cek diagnosa, dan peramalan</p> <p>CPMK.2 Menjelaskan setiap tahapan pada prosedur pembentukan model pada Analisis Deret Waktu pada suatu permasalahan nyata</p> <p>CPMK.3 Mampu mengaplikasikan Analisis Deret Waktu untuk mendapatkan ramalan yang tepat pada suatu permasalahan nyata</p> <p>CPMK.4 Mampu memanfaatkan aplikasi dan software untuk perhitungan besaran-besaran statistik untuk pembentukan model Analisis Deret Waktu</p> <p>CPMK.5 Mampu beradaptasi terhadap situasi yang dihadapi</p> <p>CPMK.6 Mampu mengambil keputusan yang tepat berdasarkan hasil ramalan dari suatu model deret waktu dan mampu mengkomunikasikan hasil analisis baik secara lisan maupun tertulis</p> <p>CPMK.7 Mampu berkomunikasi secara efektif dan bekerjasama dalam tim yang interdisiplin dan multidisiplin</p> <p>CPMK.8 Memiliki tanggung jawab dan etika profesi</p> <p>CPMK.9 Mampu memotivasi diri untuk berpikir kreatif dan belajar sepanjang hayat</p> <p><i>CLO.1 Explains the use of the concepts of Time Series Analysis which includes identification, parameter estimation, diagnostic checks, and forecasting</i></p> <p><i>CLO.2 Explains each stage of the model building procedure in Time Series Analysis on a real problem</i></p> <p><i>CLO.3 Able to apply Time Series Analysis to get the right forecast on a real problem</i></p> <p><i>CLO.4 Able to utilize applications and software to calculate statistical quantities for the formation of Time Series Analysis models</i></p> <p><i>CLO.5 Able to adapt to the situation at hand</i></p> <p><i>CLO.6 Able to make the right decisions based on forecast results from a time series model and able to communicate the results of the analysis both orally and in writing</i></p> <p><i>CLO.7 Able to communicate effectively and work together in interdisciplinary and multidisciplinary teams</i></p> <p><i>CLO.8 Have professional responsibilities and ethics</i></p> <p><i>CLO.9 Able to motivate yourself to think creatively and learn throughout life</i></p>																									
	<p>Matrik CPL – CPMK</p> <p><i>PLO-CLO Matrix</i></p> <table border="1" data-bbox="591 892 2018 1062"> <thead> <tr> <th>CPMK</th> <th>CPL-2</th> <th>CPL-9</th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>CPMK-1</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>...</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>...</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	CPMK	CPL-2	CPL-9			CPMK-1								
CPMK	CPL-2	CPL-9																								
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<p>Deskripsi Singkat MK/ Course Description</p>	<p>Analisis Deret Waktu merupakan salah satu mata kuliah keahlian yang merupakan bagian dari bidang kajian dalam rumpun mata kuliah Pemodelan Statistik. Tujuan mempelajari Analisis Deret Waktu adalah mahasiswa mampu memahami konsep-konsep statistika dalam model time series univariat (khususnya model Exponential Smoothing, Time Series Regression, Dekomposisi, ARIMA), dan Model Time Series Bivariat (khususnya Analisis Intervensi, Deteksi Outlier, Model Variasi Kalender, dan Fungsi Transfer single input), serta dapat menerapkannya pada suatu data real. Melalui mata kuliah ini diharapkan mahasiswa akan memiliki pengalaman belajar untuk berfikir secara kritis dan mampu memberikan keputusan yang tepat tentang model deret waktu yang sesuai pada suatu permasalahan dan</p>																									

	<p>penyelesaiannya. Strategi pembelajaran yang digunakan adalah diskusi dan latihan serta tugas</p> <p><i>Time series analysis is a proficiency course that is a part of the statistical modeling courses. The objectives in learning time series analysis are the students can understand the statistical concept in univariate time series (particularly in Exponential Smoothing, Time Series Regression, Decomposition, ARIMA), bivariate time series (particularly in Intervention Analysis, Outlier Detection, Calendar Variation Model, and Transfer Function with Single Input), and able to apply the methods in a real dataset. Through this course, the students are expected to have learning experiences with critical thinking and provide the appropriate decision relating to the suitable time series model on particular cases and its solution. The learning strategies used in this course are discussion, exercise, and assignment.</i></p>
Bahan Kajian: Materi Pembelajaran/ Course Material	<p>Dasar Sains, Teori Statistika, Deskripsi dan Eksplorasi, Komputasi dan Data Processing, Pemodelan, Industri dan Bisnis, Pemerintahan dan Kependudukan, Ekonomi dan Manajemen, Kesehatan dan Lingkungan, dan Sosial Humaniora</p> <p><i>Basic Science, Statistical Theory, Description and Exploration, Computing and Data Processing, Modeling, Industry and Business, Government and Population, Economics and Management, Health and Environment, and Social Humanities</i></p>
Pustaka/ References	<p>Utama/Primary:</p> <p>6. Bowerman, B.L, O'Connell, R.T. and Koehler, A.B. 2005. Forecasting, Time Series, and Regression: An Applied Approach, 4th edition. USA: Duxbury Press.</p> <p>Pendukung/Secondary:</p> <ol style="list-style-type: none"> 1. Box, G.E.P., Jenkins, G.M., and Reinsel, D., 1994. Time Series Analysis: Forecasting and Control. 2nd edition. San Fransisco: Holden Day. 2. Cryer, J.D. and Chan, K-S., 2008. Time Series Analysis: with Application in R. Boston: PWS-KENT Publishing Company. 3. Hanke, J.E. and Wichern, D.W., 2008. Business Forecasting. 9th edition. Prentice Hall. 4. Wei, W.W.S., 2006. Time Series Analysis: Univariate and Multivariate Methods. USA: Addison-Wesley Publishing Co.
Dosen Pengampu/ Lecturers	<p>Dr. Muhammad Sjahid Akbar, M.Si; Dr.rer.pol Dedy Dwi P, M.Si; Prof. Dr. Heri Kuswanto; Irhamah, M.Si, Ph.D</p>
Matakuliah syarat/ Pre-requisite Course	<p>Analisis Regresi <i>Regression Analysis</i></p>

Mg Ke- Week	Kemampuan akhir tiap tahapan belajar (Sub-CPMK) <i>Final capability for each learning step</i>	Penilaian <i>Evaluation</i>		Bantuk Pembelajaran, Metode Pembelajaran, Penugasan Mahasiswa, [Estimasi Waktu] <i>Learning Format Learning Methods Assignment for Student [Estimated Time]</i>		Materi Pembelajaran [Pustaka] <i>Learning Material [References]</i>	Bobot Penilaian (%) <i>Evaluation Weight (%)</i>
		Indikator <i>Indicator</i>	Kriteria & Bentuk <i>Criteria and Format</i>	Luring <i>Offline</i>	Daring <i>Online</i>		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Dapat memahami Pengantar deret waktu (konsep deret waktu, data <i>pattern</i> , dan dekomposisi) <i>Able to understand the introduction of time series (the concept of time series, data patterns, and decomposition)</i>	Dapat memahami konsep Deret waktu, data <i>pattern</i> , dan dekomposisi. <i>Can understand the concept of time series, data pattern, and decomposition.</i>	Observasi di kelas <i>Observation in class</i>	Ceramah Interaktif, Diskusi, <i>Interactive lecture Discussion</i> TM: 3x50" PT: 3x60" BM: 3x60"		Pengantar deret waktu. (konsep deret waktu, data <i>pattern</i> , dan dekomposisi) <i>Introduction to time series. (concept of time series, data pattern, and decomposition)</i> (Bowerman, O'Connell, Koehler, 2005, Forecasting, Time Series, and Regression: An Applied Approach, 4th edition. USA: Duxbury Press.)	10%
2-3	Dapat memahami Metode time series sederhana (<i>Naïve, moving average, eksponensial smoothing, Time Series Regression</i>) <i>Able to understand simple time series</i>	Dapat menjelaskan konsep tentang Model <i>Naïve, moving average, Exponential Smoothing, Time Series Regression</i>). <i>Can explain the concepts of Naïve Model, moving average, Exponential Smoothing, Time Series</i>	Observasi di kelas <i>Observation in class</i>	Ceramah Interaktif, Diskusi, <i>Interactive lecture Discussion</i> TM: 2x3x50"		Pengantar Peramalan Kuantitatif dengan pendekatan deret waktu. Model <i>Exponential Smoothing, Time Series Regression</i> . <i>Introduction to Quantitative</i>	10%

	<i>methods (Naive, moving average, exponential smoothing, Time Series Regression)</i>	<i>Regression).</i>		PT: 2x3x60" BM: 2x3x60"		<i>Forecasting with a time series approach. Exponential Smoothing Model, Time Series Regression.</i> Cryer, J.D. and Chan, K-S., 2008. Time Series Analysis: with Application in R. Boston: PWS-KENT Publishing Company	
4-5	Dapat memahami konsep stasioner dalam Analisis Deret Waktu <i>Able to understand the concept of stationary in Time Series Analysis</i>	<p>2.1 Dapat menjelaskan Definisi stasioneritas.</p> <p>2.2 Dapat menjelaskan <i>weak Stasionerity</i> dan <i>Strict Stasionarity</i> data deret waktu.</p> <p>2.3 Dapat melakukan penanganan (transformasi dan differencing) data deret waktu non stasioner</p> <p>2.4 Dapat melakukan transformasi Box-Cox dan Uji Dickey-Fuller pada data non stasioner di varian dan rata-rata</p> <p><i>2.1 Can explain the definition of stationarity.</i></p> <p><i>2.2 Be able to explain weak stationarity and strict stationarity of time series data.</i></p> <p><i>2.3 Be able to handle (transformation and differencing) non -</i></p>	Observasi di kelas <i>Observation in class</i>	<p>Ceramah Interaktif, Diskusi</p> <p><i>Interactive lecture Discussion</i></p> <p>TM: 2x3x50" LT: 2x3x60" BM: 2x3x60"</p>		<p>Definisi stasioneritas, <i>weak Stasionerity</i> dan <i>Strict Stasionarity</i>, serta transformasi Box-Cox, dan Uji Dickey- Fuller.</p> <p><i>Definition of stationarity, weak stationarity, and strict stationarity, and the Box - Cox transformation, and the Dickey -Fuller test.</i></p> <p>Wei, W.W.S., 2006. Time Series Analysis: Univariate and Multivariate Methods. USA: Addison-Wesley Publishing Co.</p>	10%

		<p><i>stationary time series data</i></p> <p>2.4 <i>Can perform Box - Cox transformation and Dickey -Fuller test on non - stationary data on variance and mean</i></p>					
6	<p>Dapat memahami model ARIMA pada tahap identifikasi model ARIMA pada data deret waktu yang stasioner dan non stasioner</p> <p><i>Be able to understand the ARIMA model at the ARIMA model identification stage on stationary and nonstationary time series data</i></p>	<p>2.3 Dapat menjelaskan konsep ACF dan PACF teoritis pada data deret waktu yang stasioner dan non stasioner</p> <p>2.3 <i>Can explain the concept of theoretical ACF and PACF on stationary and nonstationary time series data</i></p>	<p>Tes 1 Observasi di kelas <i>Test 1 Observation in class</i></p>	<p>Ceramah Interaktif, Diskusi</p> <p><i>Interactive lecture Discussion</i></p> <p>TM: 3x50" LT: 3x60" BM: 3x60"</p>		<p>ACF dan PACF teoritis dari proses ARMA.</p> <p><i>Theoretical ACF and PACF of the ARMA process.</i></p> <p>Wej, W.W.S., 2006. Time Series Analysis: Univariate and Multivariate Methods. USA: Addison-Wesley Publishing Co.</p>	10%
7	<p>Dapat menerapkan konsep estimasi parameter, cek diagnosa, dan pemilihan model ARIMA terbaik</p> <p><i>Be able to understand the ARIMA model at the ARIMA model identification stage on stationary and nonstationary time series data</i></p>	<p>3.1 Dapat membuktikan konsep Estimasi LS dan MLE.</p> <p>3.2 Dapat menunjukkan konsep tentang Cek diagnosa model ARIMA.</p> <p>3.3 Dapat menunjukkan konsep tentang Pemilihan model ARIMA terbaik.</p> <p>3.1 <i>Can prove the concept of Estimating LS and MLE.</i></p> <p>3.2 <i>Can demonstrate the concept of the ARIMA model diagnostic check.</i></p> <p>3.3 <i>Can demonstrate the concept of selecting</i></p>	<p>Tes 1 Observasi di kelas <i>Test 1 Observation in class</i></p>	<p>Ceramah Interaktif, Diskusi,</p> <p><i>Interactive lecture Discussion</i></p> <p>TM: 3x50" LT: 3x60" BM: 3x60"</p>		<p>Estimasi LS dan MLE. <i>LS and MLE Estimation</i></p>	15%

		<i>the best ARIMA model</i>					
8	ETS/Midterm						
9	<p>Dapat menerapkan konsep cek diagnosa Pada hasil estimasi parameter model ARIMA dan pemilihan model ARIMA terbaik</p> <p><i>Be able to apply the concept of a diagnostic check to the estimation results of the ARIMA model parameters and the selection of the best ARIMA model</i></p>	<p>4.1 Dapat menunjukkan konsep tentang Cek diagnose model ARIMA (konsep white noise, pengujian white noise dan pengujian kenormalan data.)</p> <p>4.1 <i>Be able to demonstrate the concept of ARIMA model diagnostic check (white noise concept, white noise testing and data normality testing).</i></p>	<p>Observasi di kelas</p> <p><i>Observation in class</i></p>	<p>Ceramah Interaktif, Diskusi</p> <p><i>Interactive lecture Discussion</i></p> <p>TM: 3x50" LT: 3x60" BM: 3x60"</p>		<p>Cek diagnosa model ARIMA (Ljung – Box, Normalitas)</p> <p><i>ARIMA model diagnostic check (Ljung – Box, Normality)</i></p>	10%
10	<p>Dapat menerapkan konsep peramalan titik dan interval untuk k tahap kedepan</p> <p>Dapat menerapkan konsep identifikasi, estimasi dan peramalan pada model Seasonal ARIMA</p> <p><i>Able to apply the concept of point and interval forecasting for k future stages</i></p> <p><i>Able to apply the concepts of identification, estimation and forecasting to the Seasonal ARIMA model</i></p>	<p>5.1 Dapat menunjukkan konsep Peramalan titik untuk k tahap kedepan.</p> <p>5.2 Dapat menunjukkan konsep tentang Peramalan interval untuk k tahap kedepan.</p> <p>5.3 Dapat menunjukkan konsep identifikasi, dan estimasi pada model Seasonal ARIMA.</p> <p>5.4 Dapat menunjukkan konsep tentang peramalan pada model Seasonal ARIMA.</p> <p>5.1 <i>Can show the concept of point forecasting for the k future stages.</i></p>	<p>Observasi di kelas</p> <p><i>Observation in class</i></p>	<p>Ceramah Interaktif, Diskusi</p> <p><i>Interactive lecture Discussion</i></p> <p>TM: 3x50" LT: 3x60" BM: 3x60"</p>		<p>Peramalan titik dan interval untuk k tahap kedepan</p> <p>Model Seasonal ARIMA: Identifikasi, estimasi dan peramalan</p> <p><i>Point and interval forecasting for k future stages ARIMA Seasonal</i></p> <p><i>Model: Identification, estimation and forecasting</i></p>	10%

		<p>5.2 <i>Can demonstrate the concept of interval forecasting for the k future stages.</i></p> <p>5.3 <i>Demonstrate the concept of identification and estimation in the Seasonal ARIMA model.</i></p> <p>5.4 <i>Demonstrate the concept of forecasting in the Seasonal ARIMA model</i></p>					
11	<p>Dapat memahami konsep pembentukan model intervensi dan deteksi outlier</p> <p><i>Able to understand the concept of forming intervention models and outlier detection</i></p>	<p>6.1 Dapat menjelaskan konsep Identifikasi, estimasi, cek diagnosa dan peramalan pada model intervensi.</p> <p>6.2 Dapat menjelaskan konsep tentang deteksi outlier.</p> <p>6.1 <i>Can explain the concepts of identification, estimation, diagnostic checks and forecasting in the intervention model.</i></p> <p>6.2 <i>Can explain the concept of outlier detection</i></p>	<p>Observasi di kelas Tugas 2 <i>Observation in class, Task 2</i></p>	<p>Ceramah Interaktif, Diskusi</p> <p><i>Interactive lecture Discussion</i></p> <p>TM: 2x3x50" LT: 2x3x60" BM: 2x3x60"</p>		<p>Model intervensi dan deteksi outlier: Identifikasi, estimasi, cek diagnosa dan peramalan</p> <p><i>Intervention model and outlier detection: Identification, estimation, diagnostic check</i></p>	15%
12-13	<p>Dapat memahami konsep pembentukan model variasi kalender</p> <p><i>Can understand the concept of forming a calendar variation model</i></p>	<p>7.1 Dapat menjelaskan konsep identifikasi, dan estimasi pada model variasi kalender.</p> <p>7.2 Dapat menjelaskan konsep tentang</p>	<p>Tes 2 Observasi Aktifitas di kelas <i>Test 2 Observation in class</i></p>	<p>Ceramah Interaktif, Diskusi</p> <p><i>Interactive lecture Discussion</i></p>		<p>Model variasi kalender: Identifikasi, estimasi, cek diagnosa dan peramalan</p> <p><i>Calendar variation model: Identification, estimation, diagnostic check and</i></p>	10%

		<p>peramalan pada model variasi kalender.</p> <p>7.1 <i>Can explain the concept of identification, and estimation of the calendar variation model.</i></p> <p>7.2 <i>Can explain the concept of forecasting on the calendar variation model.</i></p>		<p>TM: 2x3x50" LT: 2x3x60" BM: 2x3x60"</p>		<i>forecasting</i>		
14-15	Dapat memahami konsep pembentukan model fungsi transfer <i>Can understand the concept of forming a transfer function mode</i>	<p>8.1 Dapat menjelaskan konsep identifikasi, dan estimasi pada model fungsi transfer.</p> <p>8.2 Dapat menjelaskan konsep tentang peramalan pada model fungsi transfer.</p> <p>8.1 <i>Can explain the concept of identification, and estimation of the transfer function model.</i></p> <p>8.2 <i>Can explain the concept of forecasting in the transfer function model</i></p>	Observasi Aktifitas di kelas <i>Observation in class</i>	<p>Ceramah Interaktif, Diskusi</p> <p><i>Interactive lecture Discussion</i></p> <p>TM: 2x3x50" LT: 2x3x60" BM: 2x3x60"</p>		<p>Model fungsi transfer single input: Identifikasi, estimasi, cek diagnosa dan peramalan</p> <p><i>Single input transfer function model: Identification, estimation, diagnostic check and forecasting</i></p>	10%	
16	Evaluasi Akhir Semester / Ujian Akhir Semester/ <i>Final Exam</i>							

