

RENCANA PEMBELAJARAN SEMESTER

PROGRAM STUDI S2 SAINS DATA

FAKULTAS SAINS DAN MATEMATIKA Universitas Kristen Satya Wacana

Form						
Semester	Ganjil 2026/2027					
Mata Kuliah	BD032 PREDICTIVE TIME INTELLIGENCE					
Beban	3	SKS	T/A/P:	1/2/0	W/P:	Pilihan
Dosen Pengampu	1. Prof. Dr. Adi Setiawan, M.Sc. 2. Dr. Bambang Susanto 3. Prof. Didit Budi Nugroho, S.Si., M.Si., D.Sc. 4. Dr. Suryasatriya Trihandaru, M.Sc.nat Dosen Praktisi: Johanes Kurniawan, S.T., M.Si.D					

A. Program Learning Outcome / Capaian Pembelajaran Lulusan (CPL)

CPL01	Mampu menunjukkan sikap bertanggung jawab atas pekerjaan di bidang keahliannya secara mandiri.
CPL02	Menguasai konsep teoretis bidang pengetahuan dan keterampilan tertentu secara umum dan khusus untuk menyelesaikan masalah secara prosedural sesuai dengan lingkup pekerjaannya
CPL03	Mampu menganalisis kebutuhan perangkat lunak untuk menghasilkan spesifikasi yang tepat.
CPL04	Mampu merancang perangkat lunak yang sesuai dengan spesifikasi dan kebutuhan pengguna.
CPL05	Mampu mengimplementasikan perangkat lunak berdasarkan spesifikasi yang telah dirancang.
CPL06	Mampu berkomunikasi secara efektif, baik lisan maupun tulisan, dalam konteks profesional.
CPL07	Mampu bekerjasama dalam tim serta menunjukkan kemampuan kepemimpinan dalam konteks kerja kelompok.
CPL08	Mampu mengintegrasikan prinsip etika dan tanggung jawab sosial dalam pengambilan keputusan profesional.

B. Course Learning Outcome / Capaian Pembelajaran Mata Kuliah (CPMK)

CPMKBD03211	(CPL01) Mampu bertanggung jawab dalam proses eksplorasi data dan penerapan model analitik secara mandiri sesuai tujuan analisis.
CPMKBD03222	(CPL02) Menguasai konsep teoretis analisis waktu dan metode prediksi berbasis data time series secara prosedural.
CPMKBD03233	(CPL03) Mampu menganalisis kebutuhan analisis data runtun waktu untuk menghasilkan spesifikasi sistem prediksi yang tepat.
CPMKBD03244	(CPL04) Mampu merancang sistem prediksi berbasis data runtun waktu sesuai kebutuhan analisis pengguna.

CPMKBD03275

(CPL07) Mampu berkolaborasi dalam tim analisis data runtun waktu serta berkontribusi dalam penyelesaian masalah prediktif.

C. Prerequisite/Corequisite Courses /Prasyarat Mata Kuliah

Code	Course Name

D. Description/Deskripsi

This course introduces predictive analytics for time series data, from classical to deep learning approaches, covering: time series components and decomposition, stationarity testing, classical statistical models (AR, MA, ARIMA, SARIMA), feature engineering and machine learning models for forecasting (Random Forest, XGBoost, SVR), forecast evaluation, and deep learning approaches for time series (RNN, LSTM, GRU, Temporal Convolutional Networks, and attention/Transformer-based models), including multivariate and multi-step forecasting.

Mata kuliah ini membahas analisis prediktif untuk data runtun waktu, mulai dari pendekatan klasik hingga deep learning, meliputi: komponen dan dekomposisi time series, uji stasioneritas, model statistik klasik (AR, MA, ARIMA, SARIMA), feature engineering dan model machine learning untuk forecasting (Random Forest, XGBoost, SVR), evaluasi hasil prediksi, serta pendekatan deep learning untuk time series (RNN, LSTM, GRU, Temporal Convolutional Network, dan model berbasis attention/Transformer), termasuk forecasting multivariat dan multi-step.

E. Learning Stage/Tahap Pembelajaran

We ek	Final Ability	Material	Methods	Dura tion	Indicators	Assesment
1	<i>Have broad knowledge of time series data and predictive intelligence concepts (trend, seasonality, noise).</i> Memiliki pengetahuan luas tentang data time series dan konsep predictive intelligence (tren, musiman, noise).	Introduction to Time Series & Predictive Intelligence	Presentation Discussion Demonstration Practicum	150'	Provides information about time series components and predictive intelligence; Discussion	Discussion
2	<i>Master time series decomposition and stationarity testing.</i> Menguasai dekomposisi time series dan uji stasioneritas.	Time Series Decomposition & Stationarity Testing	Presentation Discussion Demonstration Practicum	150'	Obtain information about decomposition and stationarity testing; Discussion and Practicum	Discussion
3	<i>Master classical statistical models: Autoregressive (AR) and Moving Average (MA).</i>	Classical Models: AR & MA	Presentation Discussion Demonstration Practicum	150'	Obtain information about AR and MA models; Discussion and Practicum	Discussion

	Menguasai model statistik klasik: Autoregressive (AR) dan Moving Average (MA).					
4	<i>Master classical statistical models: ARIMA and SARIMA.</i> Menguasai model statistik klasik: ARIMA dan SARIMA.	Classical Models: ARIMA & SARIMA	Presentation Discussion Demonstration Practicum	150'	Obtain information about ARIMA and SARIMA models; Discussion and Practicum	Task: Submit a practicum report.
5	<i>Master practical work related to classical time series models and their exploratory data analysis.</i> Menguasai praktikum terkait model time series klasik dan eksplorasi data terkait.	Practicum/Case Study related to Meeting 1-4	Presentation Discussion Demonstration Practicum	150'	Carrying out practicum and tutorials related to Meeting 1 to Meeting 4	Practical Assignment /Report - CPMK1 (20%)
6	<i>Master feature engineering techniques for time series forecasting (lag features, rolling statistics).</i> Menguasai teknik feature engineering untuk forecasting time series (lag feature, rolling statistics).	Feature Engineering for Time Series Forecasting	Presentation Discussion Demonstration Practicum	150'	Obtain information about feature engineering for time series; Discussion and Practicum	Discussion
7	<i>Master machine learning regression models for forecasting (Random Forest, XGBoost, SVR).</i> Menguasai model regresi machine learning untuk forecasting (Random Forest, XGBoost, SVR).	Machine Learning Models for Forecasting: Random Forest, XGBoost & SVR	Presentation Discussion Demonstration Practicum	150'	Obtain information about ML models for forecasting; Discussion and Practicum	Discussion
8	<i>Master forecast evaluation methods (train-test split, cross-validation, MAE/RMSE/MAPE).</i> Menguasai metode evaluasi hasil prediksi (train-test split, cross-validation, MAE/RMSE/MAPE).	Forecast Evaluation: Validation & Error Metrics	Presentation Discussion Demonstration Practicum	150'	Obtain information about forecast evaluation methods; Discussion and Practicum	Task: Submit a practicum report.
9	<i>Master practical work related to feature engineering and machine learning models for forecasting.</i> Menguasai praktikum terkait feature engineering dan model machine learning untuk forecasting.	Practicum/Case Study related to Meeting 6-8	Presentation Discussion Demonstration Practicum	150'	Carrying out practicum and tutorials related to Meeting 6 to Meeting 8	Practical Assignment /Report - CPMK2 (20%)
10	<i>Master Recurrent Neural Networks (RNN) for time series forecasting.</i>	Recurrent Neural Networks (RNN) for Time Series Forecasting	Presentation Discussion Demonstration Practicum	150'	Obtain information about RNN for forecasting;	Discussion

	Menguasai Recurrent Neural Network (RNN) untuk forecasting time series.				Discussion and Practicum	
11	<i>Master LSTM and GRU architectures for time series forecasting.</i> Menguasai arsitektur LSTM dan GRU untuk forecasting time series.	LSTM & GRU for Time Series Forecasting	Presentation Discussion Demonstration Practicum	150'	Obtain information about LSTM and GRU for forecasting; Discussion and Practicum	Discussion
12	<i>Master Temporal Convolutional Networks (TCN) and attention/Transformer-based models for time series.</i> Menguasai Temporal Convolutional Network (TCN) dan model berbasis attention/Transformer untuk time series.	Temporal Convolutional Networks (TCN) & Transformer-Based Models	Presentation Discussion Demonstration Practicum	150'	Obtain information about TCN and Transformer-based forecasting models; Discussion and Practicum	Discussion
13	<i>Master multivariate and multi-step time series forecasting using deep learning.</i> Menguasai forecasting time series multivariat dan multi-step menggunakan deep learning.	Multivariate & Multi-Step Forecasting with Deep Learning	Presentation Discussion Demonstration Practicum	150'	Obtain information about multivariate and multi-step deep learning forecasting; Discussion and Practicum	Task: Submit a practicum report.
14	<i>Master practical work related to deep learning approaches for time series forecasting.</i> Menguasai praktikum terkait pendekatan deep learning untuk forecasting time series.	Practicum/Case Study related to Meeting 10-13	Presentation Discussion Demonstration Practicum	150'	Carrying out practicum and tutorials related to Meeting 10 to Meeting 13	Practical Assignment /Report - CPMK3 (20%)
15	<i>Able to design and build an applied predictive time intelligence system.</i> Mampu merancang dan membangun sistem predictive time intelligence secara terapan.	PROJECT WORK	Project Work	150'	Design and build a predictive time intelligence project	Final Project Work - CPMK4 (20%)
16	<i>Able to collaborate in a team and present the predictive time intelligence project.</i> Mampu berkolaborasi dalam tim dan mempresentasikan proyek predictive time intelligence.	PROJECT PRESENTATION	Presentation Discussion	150'	Presenting the predictive time intelligence project as a team	Project Presentation - CPMK5 (20%)

Note/Catatan untuk Tabel E.

Abbreviation	Description
CPL	Capaian Pembelajaran Lulusan / Program Learning Outcome

CPMK	Capaian Pembelajaran Mata Kuliah / Course Learning Outcome
AR	Autoregressive
MA	Moving Average
ARIMA	Autoregressive Integrated Moving Average
SARIMA	Seasonal Autoregressive Integrated Moving Average
RNN	Recurrent Neural Network
LSTM	Long Short-Term Memory
GRU	Gated Recurrent Unit
TCN	Temporal Convolutional Network

F. Learning Media and Tools

Python/R (statsmodels, pmdarima, scikit-learn, XGBoost, PyTorch/TensorFlow), Jupyter Notebook/Google Colab, Computer, Flearn (Online Learning Media), WAG and Google Meet/Zoom.

G. Student Learning Experience/Portfolio

Students gain experience in analyzing and forecasting time series data using classical statistical models, machine learning models, and deep learning architectures, evaluating forecast accuracy, and collaboratively building a predictive time intelligence project.

Mahasiswa memperoleh pengalaman dalam menganalisis dan memprediksi data time series menggunakan model statistik klasik, model machine learning, dan arsitektur deep learning, mengevaluasi akurasi hasil prediksi, serta membangun proyek predictive time intelligence secara kolaboratif dalam tim.

H. References

1. [Hyndman, R. J., & Athanasopoulos, G. \(2021\). Forecasting: Principles and Practice \(3rd ed.\). OTexts.](#)
2. [Box, G. E. P., Jenkins, G. M., Reinsel, G. C., & Ljung, G. M. \(2015\). Time Series Analysis: Forecasting and Control \(5th ed.\). Wiley.](#)
3. [Hochreiter, S., & Schmidhuber, J. \(1997\). Long Short-Term Memory. Neural Computation, 9\(8\), 1735-1780.](#)
4. [Bai, S., Kolter, J. Z., & Koltun, V. \(2018\). An Empirical Evaluation of Generic Convolutional and Recurrent Networks for Sequence Modeling.](#)
5. [Vaswani, A., et al. \(2017\). Attention Is All You Need. Advances in Neural Information Processing Systems \(NeurIPS\).](#)

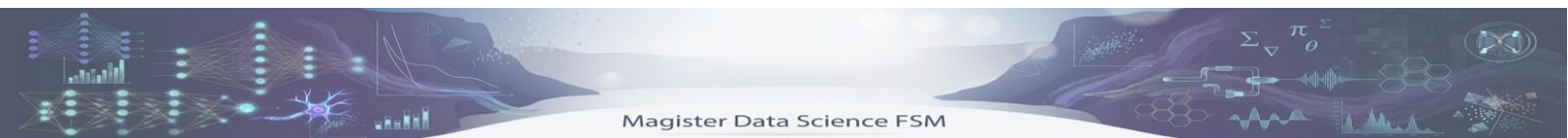
I. Authorization

Pengembang	Tanggal	Koordinator	Kaprodi
	8 Agustus 2026	Prof. Hanna Arini Parhusip, M.Sc.nat	Prof. Hanna Arini Parhusip, M.Sc.nat



Satya Wacana Christian University

Dr. Suryasatriya Trihandaru, M.Sc.nat			
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Magister Data Science FSM