RENCANA PEMBELAJARAN SEMESTER

PROGRAM STUDI S2 SAINS DATA

FAKULTAS SAINS DAN MATEMATIKA
Universitas Kristen Satya Wacana

Form						
Semester	Ganjil 2026/2027					
Mata Kuliah	BD001 DATA MINING					
Beban	3	SKS	T/A/P:	1/2/0	W/P:	Wajib
Dosen Pengampu	1. Prof. Dr. Adi Setiawan, M.Sc. 2. Dr. Bambang Susanto, M.S. 3. Prof. Didit Budi Nugroho, S.Si., M.Si., D.Sc. Dosen Praktisi: Denny Indrajaya, S.Si., 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)	
CPMKBD00111	(CPL01) Mampu menunjukkan sikap bertanggung jawab dalam mengelola, menganalisis, dan menafsirkan data secara mandiri sesuai dengan kaidah keilmuan.
CPMKBD00122	(CPL02) Menguasai konsep teoretis dasar data mining serta metode analisisnya untuk menyelesaikan permasalahan data secara prosedural.
CPMKBD00143	(CPL04) Mampu merancang model dan alur perangkat lunak data mining sesuai spesifikasi analisis dan kebutuhan pengguna.
CPMKBD00154	(CPL05) Mampu mengimplementasikan algoritma dan model data mining ke dalam perangkat lunak sesuai spesifikasi yang telah dirancang.

C. Prerequisite/Corequisite Courses /Prasyarat Mata Kuliah	
Code	Course Name

D. Description/Deskripsi
This course introduces the concepts and techniques of Data Mining at the graduate level, covering: data understanding, data preprocessing (cleaning, missing value handling), data transformation and feature engineering, exploratory data analysis (EDA), association rule mining (Apriori, FP-Growth), classification (decision tree, Naive Bayes, k-NN), clustering (K-Means, hierarchical clustering), and the design, implementation, and evaluation of a data mining system for real case studies. Mata kuliah ini membahas konsep dan teknik Data Mining pada level magister, meliputi: data understanding, data preprocessing (cleaning, penanganan missing value), data transformation dan feature engineering, exploratory data analysis (EDA), association rule mining (Apriori, FP-Growth), classification (decision tree, Naive Bayes, k-NN), clustering (K-Means, hierarchical clustering), serta perancangan, implementasi, dan evaluasi sistem data mining untuk studi kasus nyata.

E. Learning Stage/Tahap Pembelajaran

Week	Final Ability	Material	Methods	Duration	Indicators	Assesment
1	*Have broad knowledge of Data Mining: concepts, scope, and its role in data science.* Memiliki pengetahuan luas tentang Data Mining: konsep, ruang lingkup, dan peran dalam sains data.	Introduction to Data Mining: Concepts, Scope & Role in Data Science	Presentation Discussion Demonstration Practicum	150'	Provides information about Data Mining concepts and scope; Discussion	Discussion
2	*Master data understanding: data characteristics, data types, and data sources.* Menguasai data understanding: karakteristik data, tipe data, dan sumber data.	Data Understanding: Characteristics, Types & Sources	Presentation Discussion Demonstration Practicum	150'	Obtain information about data understanding; Discussion and Practicum	Discussion
3	*Master data preprocessing: data cleaning and missing value handling.* Menguasai data preprocessing: data cleaning dan penanganan missing value.	Data Preprocessing: Data Cleaning & Missing Value Handling	Presentation Discussion Demonstration Practicum	150'	Obtain information about data preprocessing; Discussion and Practicum	Discussion
4	*Master data transformation, feature engineering, and Exploratory Data Analysis (EDA) for data mining.*	Data Transformation, Feature Engineering &	Presentation Discussion Demonstration Practicum	150'	Obtain information about data transformation, feature	Task: Submit a practicum report.

	Menguasai data transformation, feature engineering, dan Exploratory Data Analysis (EDA) untuk data mining.	Exploratory Data Analysis (EDA)			engineering, and EDA; Discussion and Practicum	
5	*Master practical work related to data understanding, preprocessing, transformation, and EDA.* Menguasai praktikum terkait data understanding, preprocessing, transformation, dan EDA.	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 (25%)
6	*Master association rule mining: concepts, Apriori, and FP-Growth.* Menguasai association rule mining: konsep, Apriori, dan FP-Growth.	Association Rule Mining: Concepts, Apriori & FP-Growth	Presentation Discussion Demonstration Practicum	150'	Obtain information about association rule mining; Discussion and Practicum	Discussion
7	*Master classification: basic concepts and evaluation metrics.* Menguasai classification: konsep dasar dan metrik evaluasi.	Classification: Basic Concepts & Evaluation Metrics	Presentation Discussion Demonstration Practicum	150'	Obtain information about classification and evaluation metrics; Discussion and Practicum	Discussion
8	*Master advanced classification methods: Decision Tree, Naive Bayes, and k-NN.* Menguasai metode classification lanjutan: Decision Tree, Naive Bayes, dan k-NN.	Advanced Classification: Decision Tree, Naive Bayes & k-NN	Presentation Discussion Demonstration Practicum	150'	Obtain information about advanced classification methods; Discussion and Practicum	Task: Submit a practicum report.
9	*Master practical work related to association rule mining and classification.* Menguasai praktikum terkait association rule mining dan classification.	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 (25%)
10	*Master clustering: concepts, K-Means, and hierarchical clustering algorithms.* Menguasai clustering: konsep, algoritma K-Means, dan hierarchical clustering.	Clustering: Concepts, K-Means & Hierarchical Clustering	Presentation Discussion Demonstration Practicum	150'	Obtain information about clustering algorithms; Discussion and Practicum	Discussion
11	*Master the validation and interpretation of clustering results.*	Validation & Interpretation of Clustering Results	Presentation Discussion Demonstration Practicum	150'	Obtain information about clustering validation and interpretation;	Discussion

	Menguasai validasi dan interpretasi hasil clustering.				Discussion and Practicum	
12	*Master the design of data mining systems and process flows.* Menguasai perancangan sistem dan alur proses data mining.	Design of Data Mining Systems & Process Flow	Presentation Discussion Demonstration Practicum	150'	Obtain information about data mining system design; Discussion and Practicum	Discussion
13	*Master the implementation of data mining algorithms using software tools.* Menguasai implementasi algoritma data mining menggunakan perangkat lunak.	Implementation of Data Mining Algorithms Using Software Tools	Presentation Discussion Demonstration Practicum	150'	Obtain information about data mining algorithm implementation; Discussion and Practicum	Task: Submit a practicum report.
14	*Master the evaluation and validation of data mining models.* Menguasai evaluasi dan validasi model data mining.	Practicum/Case Study: Evaluation & Validation of Data Mining Models	Presentation Discussion Demonstration Practicum	150'	Carrying out practicum and tutorials related to Meeting 10 to Meeting 13	Practical Assignment /Report - CPMK3 (25%)
15	*Able to design and build an end-to-end applied data mining project.* Mampu merancang dan membangun proyek data mining end-to-end secara terapan.	PROJECT WORK	Project Work	150'	Design, build, and implement an end-to-end data mining project	Final Project Work - CPMK4 (25%)
16	*Able to present and defend the data mining project.* Mampu mempresentasikan dan mempertanggungjawabkan proyek data mining.	PROJECT PRESENTATION	Presentation Discussion	150'	Presenting the data mining project	Project Presentation - CPMK1 (25%)

Note/Catatan untuk Tabel E.

Abbreviation	Description
CPL	Capaian Pembelajaran Lulusan / Program Learning Outcome
CPMK	Capaian Pembelajaran Mata Kuliah / Course Learning Outcome
EDA	Exploratory Data Analysis
FP-Growth	Frequent Pattern Growth
k-NN	k-Nearest Neighbors

F. Learning Media and Tools
Python/R (pandas, scikit-learn, mlxtend, arules), Jupyter Notebook/Google Colab, Computer, Flearn (Online Learning Media), WAG and Google Meet/Zoom.

G. Student Learning Experience/Portfolio
Students gain experience in preparing and exploring data, discovering association patterns, building and evaluating classification and clustering models, and designing, implementing, and presenting an end-to-end data mining project. Mahasiswa memperoleh pengalaman dalam menyiapkan dan mengeksplorasi data, menemukan pola asosiasi, membangun dan mengevaluasi model classification dan clustering, serta merancang, mengimplementasikan, dan mempresentasikan proyek data mining end-to-end.

H. References
1. Han, J., Kamber, M., & Pei, J. (2011). Data Mining: Concepts and Techniques (3rd ed.). Morgan Kaufmann.
2. Tan, P.-N., Steinbach, M., Karpatne, A., & Kumar, V. (2019). Introduction to Data Mining (2nd ed.). Pearson.
3. Witten, I. H., Frank, E., Hall, M. A., & Pal, C. J. (2016). Data Mining: Practical Machine Learning Tools and Techniques (4th ed.). Morgan Kaufmann.
4. Agrawal, R., & Srikant, R. (1994). Fast Algorithms for Mining Association Rules in Large Databases. Proceedings of VLDB.
5. Han, J., Pei, J., & Yin, Y. (2000). Mining Frequent Patterns without Candidate Generation. Proceedings of ACM SIGMOD.

I. Authorization

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