MODULE HANDBOOK

DATA MINING

BACHELOR DEGREE PROGRAM
DEPARTEMENT OF STATISTICS
FACULTY OF SCIENCE AND DATA ANALYTICS
INSTITUT TEKNOLOGI SEPULUH NOPEMBER

ENDORSEMENT PAGE

	MODULE HANDBOOKDATA MINING **DEPARTMENT OF STATISTICS** **INSTITUT TEKNOLOGI SEPULUH NOPEMBER**

Proses ***Process***	**Penanggung Jawab** ***Person in Charge***			**Tanggal** ***Date***
	Nama ***Name***	**Jabatan** ***Position***	**Tandatangan** ***Signature***	
Perumus *Preparation*	Dr. Santi Wulan Purnami, M.Si;	Dosen *Lecturer*		**March 28, 2019**
Pemeriksa dan Pengendalian *Review and Control*	Dr. Santi Wulan Purnami, M.Si; Irhamah, M.Si, Ph.D	Tim kurikulum *Curriculum team*		**April 15, 2019**
Persetujuan *Approval*	Prof. NuR Iriawan	Koordinator RMK *Course Cluster Coordinator*		**July 17, 2019**
Penetapan *Determination*	Dr. Kartika Fithriasari, M.Si	Kepala Departemen *Head of Department*		**July 30, 2019**

MODULE HANDBOOK

DATA MINING

Module name	**DATA MINING**	
Module level	Undergraduate	
Code	KS184645	
Course (if applicable)	DATA MINING	
Semester	Sixth Semester (Genapl)	
Person responsible for the module	Dr. Santi Wulan Purnami, M.Si	
Lecturer	Dr. Santi Wulan Purnami, M.Si; Irhamah, M.Si, Ph.D	
Language	Bahasa Indonesia and English	
Relation to curriculum	Undergradute degree program, **mandatory**, 6th semester.	
Type of teaching, contact hours	Lectures, <50 students	
Workload	1. Lectures : 2 x 50 = 100 minutes per week. 2. Practicum : 1x170 = 170 minutes per week. 3. Exercises and Assignments : 3 x 60 = 180 minutes (3 hours) per week. 4. Private learning : 3 x 60 = 130 minutes (3 hours) per week.	
Credit points	3 credit points (sks)	
Requirements according to the examination regulations	A student must have attended at least 80% of the lectures to sit in the exams.	
Mandatory prerequisites	Multivariate Analysis	
Learning outcomes and their corresponding PLOs	*CLO.1 Can explain the concept of data mining and its application in various fields* *CLO.3 Able to explain data mining procedures starting from pre-processing to presenting information* *CLO.4 Able to identify, formulate, and solve statistical problems using techniques in Data Mining* *CLO-5 Able to use computational techniques and modern computer equipment required in Data Mining* *CLO-6 Has knowledge of current and upcoming issues related to the Data Mining field* .	PLO-03 PLO-04

	CLO. 7 Able to communicate effectively and cooperate in an interdisciplinary team and multidisciplinary teams. *CLO. 8 Have professional responsibility and ethics* *CLO. 9 Able to motivate oneself to think creatively and learn throughout life*	PLO-05 PLO-06
Content	*DATA MINING is one subject in the field of theory, which aims to master the basic concepts of mathematics to understand the theory of vectors, basic operations of DATA MINING, determinants, inverses, random vectors, systems of linear equations, vector spaces, values and eigenvectors. Besides that, students able to use this concept for processing random variables, formulating modeling and calculating univariate and multivariate calculations. To achieve this goal, the learning strategy used is discussion and practice both manually and with a computer program package*	
Study and examination requirements and forms of examination	• In-class exercises • Assignment 1, 2, 3 • Mid-term examination • Final examination	
Media employed	LCD, whiteboard, websites (myITS Classroom), zoom.	
Reading list	1. Witten, I.H., Data Mining: Practical Machine Learning Tools and Techniques, Second Edition, Elsevier, 2005. 2. Han,J., Kamber, M. and J. Pei, Data Mining: Concepts and Techniques. Morgan Kaufmann, 3rded. , 2011 3. Hastie, T., Tibshirani, R., Friedman, J., The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition, Springer, 2009. 4. Tan, P.-N. , Steinbach, M. and Kumar, V., Introduction to Data Mining, Wiley, 2005 5. Nisbet, R. and Elder, J., Handbook of Statistical Analysis and Data Mining, Elsevier, 2009. 6. Duda, R. O., Hart, P. E., and Stork, D. G., Pattern Classification, 2ed., Wiley, Interscience, 2000 7. Larose, D.T., Data Mining Methods And Models, John Wiley & Sons, Inc., , 2006 8. James, G., Witten, D., Hastie, T., Tibshirani, R., An Introduction to Statistical Learning with Application in R, Springer Inc. , 2013	

	Program Studi	Sarjana, Departemen Statistika, FMKSD-ITS
	Mata Kuliah	Data Mining
	Kode Mata Kuliah	KS184645
	Semester/SKS	VI/3
	MK Prasyarat	Analisis Multivariat
RP-S1	Dosen Pengampu	Dr. Santi Wulan Purnami, S.Si, M.Si ; Irhamah, M.Si, PhD ; Dr. Dra. Kartika Fithriasari, M.Si

Bahan Kajian *Study Materials*	Dasar Sains, Teori Statistika, Pengumpulan Data, Deskripsi dan Eksplorasi, Komputasi dan Data Processing, Pemodelan, Industri dan Bisnis, Pemerintahan dan Kependudukan, Ekonomi dan Manajemen, Kesehatan dan Lingkungan *Basic Science, Statistical Theory, Data Collection, Description and Exploration, Computing and Data Processing, Modeling, Industry and Business, Governance and Population, Economics and Management, Health and Environment*
CPL yang dibebankan MK *PLO (Program Learning Outcome)*	CPL-3 Mampu menganalisis data dengan metode statistika yang tepat dan mengintepretasikannya CPL-4 Mampu mengindentifikasi,memformulasi, dan menyelesaikan masalah statistika di berbagai bidang terapan CPL-5 Mampu menggunakan teknik komputasi dan perangkat komputer modern yang diperlukan dalam bidang statistika dan sains data CPL-6 Memiliki pengetahuan tentang isu terkini dan mendatang yang berkaitan dengan bidang statistika dan sains data *PLO-3 Able to analyze data with appropriate statistical methods and interpret them* *PLO-4 Able to identify, formulate, and solve statistical problems in various applied fields* *PLO-5 Able to use computational techniques and modern computer equipment required in statistics and data science* *PLO-6 Has knowledge of current and upcoming issues related to statistics and data science*
CP-MK *CLO*	CPMK.1 Dapat menjelaskan konsep data mining dan aplikasinya di berbagai bidang CPMK.3 Mampu menjelaskan prosedur mining data mulai dari pre-processing sampai menyajikan informasi CPMK.4 Mampu mengindentifikasi, memformulasi, dan menyelesaikan masalah statistika menggunakan teknik dalam Data Mining CPMK-5 Mampu menggunakan teknik komputasi dan perangkat komputer modern yang diperlukan dalam Data Mining CPMK-6 Memiliki pengetahuan tentang isu terkini dan mendatang yang berkaitan dengan bidang Data Mining CPMK-7 Mampu berkomunikasi secara efektif dan bekerjasama dalam tim yang interdisiplin dan multidisiplin CPMK-8 Memiliki tanggung jawab dan etika profesi CPMK-9 Mampu memotivasi diri untuk berpikir kreatif dan belajar sepanjang hayat *CLO.1 Can explain the concept of data mining and its application in various fields* *CLO.3 Able to explain data mining procedures starting from pre-processing to presenting information* *CLO.4 Able to identify, formulate, and solve statistical problems using techniques in Data Mining* *CLO-5 Able to use computational techniques and modern computer equipment required in Data Mining* *CLO-6 Has knowledge of current and upcoming issues related to the Data Mining field* *CLO-7 Able to communicate effectively and work together in interdisciplinary and multidisciplinary teams* *CLO-8 Has professional responsibilities and ethics* *CLO-9 Able to motivate yourself to think creatively and learn lifelong*

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Perte-muan *Meeting*	**Kemampuan Akhir Sub CP-MK** *Final Ability*	**Keluasan (materi pembelajaran)** *Extent (learning material)*	**Metode Pembelajaran** *Learning methods*	**Estimasi Waktu** *Duration*	**Bentuk Evaluasi** *Evaluation Type*	**Kriteria dan Indikator Penilaian** *Assessment Criteria and Indicators*	**Bobot Penilaian** *Scoring*
1,2	Dapat menjelaskan konsep-konsep dasar data mining dan aplikasinya *Can explain the basic concepts of data mining and their applications*	Pendahuluan: • pengertian DM, KDD, AI, ML • Alasan menggunakan DM • Tipe Data • Proses KDD • Aplikasi DM • Software DM Metode DM *Preliminary:* • *Understanding DM, KDD, AI, ML* • *Reasons for using DM* • *Data Type* • *KDD process* • *DM application* • *DM software* • *DM method*	Ceramah Interaksi, Diskusi, Latihan, Seminar *Interaction Lectures, Discussions, Exercises, Seminars*	400 menit *400 minutes*	Tugas, Latihan Soal, Laporan Praktikum *Assignments, Practice Questions, Practicum Report*	1. Dapat menjelaskan konsep-konsep dasar data mining 2. Dapat menyebutkan aplikasi data mining dalam berbagai bidang *1. Can explain the basic concepts of data mining* *2. Can mention data mining applications in various fields*	10% /10%
3,4	Dapat melakukan data integration, transformation, data	Data integration, transformation, data		400 menit	Tugas, Latihan Soal, Laporan Praktikum	Dapat melakukan prosedur data integration, transformation, data reduction dan data discretization	10% /20%

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Perte-muan *Meeting*	**Kemampuan Akhir Sub CP-MK** *Final Ability*	**Keluasan (materi pembelajaran)** *Extent (learning material)*	**Metode Pembelajaran** *Learning methods*	**Estimasi Waktu** *Duration*	**Bentuk Evaluasi** *Evaluation Type*	**Kriteria dan Indikator Penilaian** *Assessment Criteria and Indicators*	**Bobot Penilaian** *Scoring*
	reduction dan data discretization *Can perform data integration, transformation, data reduction and data discretization*	reduction dan data discretization *Data integration, transformation, data reduction and data discretization*		*400 minutes*	*Assignments, Practice Questions, Practicum Report*	*Can perform data integration, transformation, data reduction and data discretization procedures*	
5	Dapat mendeteksi adanya data missing values dan noisy serta dapat mengatasinya *It can detect any missing values and noisy data and can handle it*	Pre processing data: Cleaning, missing value, noise *Pre processing data: Cleaning, missing value, noise*	Ceramah Interaksi, Diskusi, Latihan, Seminar *Interaction Lectures, Discussions, Exercises, Seminars*	200 menit *200 minutes*	Tugas, Latihan Soal, Laporan Praktikum *Assignments, Practice Questions, Practicum Report*	1. Dapat menjelaskan pentingnya melakukan preprocessing data 2. Dapat melakukan prosedur data cleaning yang meliputi missing values dan noisy data *1. Can explain the importance of preprocessing data* *2. Can perform data cleaning procedures which include missing values and noisy data*	10% /30%
6	Dapat menjelaskan feature selection dan feature extraction dan menerapkannya pada data *Can explain feature selection and feature*	Feature selection /Feature extraction *Feature selection / Feature extraction*	Ceramah Interaksi, Diskusi, Latihan, Seminar *Interaction Lectures, Discussions, Exercises, Seminars*	200 menit *200 minutes*	Tugas, Latihan Soal, Laporan Praktikum *Assignments, Practice Questions, Practicum Report*	Dapat menjelaskan konsep feature selection dan feature extraction dan menerapkannya pada data *Can explain the concept of feature selection and feature extraction and apply it to data*	10% /40%

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Perte-muan *Meeting*	**Kemampuan Akhir Sub CP-MK** *Final Ability*	**Keluasan (materi pembelajaran)** *Extent (learning material)*	**Metode Pembelajaran** *Learning methods*	**Estimasi Waktu** *Duration*	**Bentuk Evaluasi** *Evaluation Type*	**Kriteria dan Indikator Penilaian** *Assessment Criteria and Indicators*	**Bobot Penilaian** *Scoring*
	extraction and apply it to data						
7	Dapat menjelaskan Mining Associations rule dan recommendation system serta menerapkan pada data *Can explain Mining Associations rules and recommendation systems and apply them to data*	Mining Associations rule: Apriori Methods, Recommender System: Collaborative Filtering *Mining Associations rule: Apriori Methods, Recommender System: Collaborative Filtering*	Ceramah Interaksi, Diskusi, Latihan, Seminar *Interaction Lectures, Discussions, Exercises, Seminars*	200 menit *200 minutes*	Tugas, Latihan Soal, Laporan Praktikum *Assignments, Practice Questions, Practicum Report*	Dapat melakukan prosedur Mining Associations rule dan Recommender System *Can perform Mining Associations rule and Recommender System procedures*	10% /50%
8	**ETS**						
9	Dapat menjelaskan konsep unsupervised learning dan menerapkan pada data *Can explain unsupervised learning concepts and apply them to data*	Unsupervised Learning Method (Cluster methods): K-Medoid, DBScan *Unsupervised Learning Method (Cluster methods): K-Medoid, DBScan*	Ceramah Interaksi, Diskusi, Latihan, Seminar *Interaction Lectures, Discussions, Exercises, Seminars*	200 menit *200 minutes*	Tugas, Latihan Soal, Laporan Praktikum *Assignments, Practice Questions, Practicum Report*	1. Dapat melakukan metode clustering dalam problem riil 2. Dapat mengevaluasi hasil cluster *1. Can do the clustering method in real problems* *2. Can evaluate cluster results*	5% /55%

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Perte-muan *Meeting*	**Kemampuan Akhir Sub CP-MK** *Final Ability*	**Keluasan (materi pembelajaran)** *Extent (learning material)*	**Metode Pembelajaran** *Learning methods*	**Estimasi Waktu** *Duration*	**Bentuk Evaluasi** *Evaluation Type*	**Kriteria dan Indikator Penilaian** *Assessment Criteria and Indicators*	**Bobot Penilaian** *Scoring*
10	Dapat menjelaskan konsep Decision tree dan menerapkannya pada data *Can explain the Decision Tree concept and apply it to data*	Supervised Learning Method: Decision tree *Supervised Learning Method: Decision tree*	Ceramah Interaksi, Diskusi, Latihan, Seminar *Interaction Lectures, Discussions, Exercises, Seminars*	200 menit *200 minutes*	Tugas, Latihan Soal, Laporan Praktikum *Assignments, Practice Questions, Practicum Report*	1. Dapat melakukan prosedur decision tree pada problem data riil 2. Dapat menyajikan hasil analisis menjadi informasi yang menarik *1. Can perform decision tree procedures on real data problems* *2. Can present the results of the analysis into interesting information*	5% /60%
11,12	Dapat menjelaskan konsep Naïve bayes dan menerapkannya pada data *Can explain Naïve Bayes concepts and apply them to data*	Supervised Learning Method: Naïve bayes and kNN *Supervised Learning Method: Naïve bayes and kNN*	Ceramah Interaksi, Diskusi, Latihan *Interaction Lectures, Discussions, Exercises, Seminars*	400 menit *400 minutes*		1. Dapat melakukan prosedur Naïve bayes dan kNN pada problem data riil 2. Dapat menyajikan hasil analisis menjadi informasi yang menarik *1. Can perform Naïve Bayes and KNN procedures on real data problems* *2. Can present the results of the analysis into interesting information*	10% /70%
13	Dapat menjelaskan konsep SVM dan menerapkannya pada data	Supervised Learning Method: Support Vector Machine (SVM) *Supervised Learning Method: Support Vector Machine (SVM)*	Ceramah Interaksi, Diskusi, Latihan, Seminar *Interaction Lectures, Discussions,*	200 menit *200 minutes*	Tugas, Latihan Soal, Laporan Praktikum *Assignments, Practice Questions,*	1. Dapat melakukan prosedur SVM pada problem data riil 2. Dapat menyajikan hasil analisis menjadi informasi yang menarik *1. Can perform SVM procedures on real data problems*	10% /80%

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Perte-muan *Meeting*	**Kemampuan Akhir Sub CP-MK** *Final Ability*	**Keluasan (materi pembelajaran)** *Extent (learning material)*	**Metode Pembelajaran** *Learning methods*	**Estimasi Waktu** *Duration*	**Bentuk Evaluasi** *Evaluation Type*	**Kriteria dan Indikator Penilaian** *Assessment Criteria and Indicators*	**Bobot Penilaian** *Scoring*
	Can explain SVM concepts and apply them to data		*Exercises, Seminars*		*Practicum Report*	*2. Can present the results of the analysis into interesting information*	
14	Dapat menjelaskan konsep SVR dan menerapkannya pada data *Can explain the SVR concept and apply it to data*	Prediction model: Support Vector Regression (SVR) *Prediction model: Support Vector Regression (SVR)*	Ceramah Interaksi, Diskusi, Latihan, Seminar *Interaction Lectures, Discussions, Exercises, Seminars*	200 menit *200 minutes*	Tugas, Latihan Soal, Laporan Praktikum *Assignments, Practice Questions, Practicum Report*	1. Dapat melakukan prosedur SVR pada problem data riil 2. Dapat menyajikan hasil analisis menjadi informasi yang menarik *1. Can perform SVR procedures on real data problems* *2. Can present the results of the analysis into interesting information*	10% /90%
15	Dapat menerapkan metode dan menganalisis dengan menggunakan ukuran evaluasi yang sesuai pada problem klasifikasi serta regresi *Can apply and analyze methods using appropriate evaluation measures on classification and regression problems*	Credibility: Evaluating what's been learned *Credibility: Evaluating what's been learned*	Ceramah Interaksi, Diskusi, Latihan, Seminar *Interaction Lectures, Discussions, Exercises, Seminars*	200 menit *200 minutes*	Tugas, Latihan Soal, Laporan Praktikum *Assignments, Practice Questions, Practicum Report*	1. Dapat melakukan prosedur credibility untuk problem klasifikasi 2. Dapat melakukan prosedur credibility untuk problem regresi *1. Can perform credibility procedures for classification problems* *2. Can perform credibility procedures for regression problems*	10%/100%
16	**EAS**						

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PUSTAKA / *RFERERENCES :*

1. Witten, I.H., Data Mining: Practical Machine Learning Tools and Techniques, Second Edition, Elsevier, 2005.
2. Han,J., Kamber, M. and J. Pei, Data Mining: Concepts and Techniques. Morgan Kaufmann, 3rded. , 2011
3. Hastie, T., Tibshirani, R., Friedman, J., The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition, Springer, 2009.
4. Tan, P.-N. , Steinbach, M. and Kumar, V., Introduction to Data Mining, Wiley, 2005
5. Nisbet, R. and Elder, J., Handbook of Statistical Analysis and Data Mining, Elsevier, 2009.
6. Duda, R. O., Hart, P. E., and Stork, D. G., Pattern Classification, 2ed., Wiley, Interscience, 2000
7. Larose, D.T., Data Mining Methods And Models, John Wiley & Sons, Inc., , 2006
8. James, G., Witten, D., Hastie, T., Tibshirani, R., An Introduction to Statistical Learning with Application in R, Springer Inc. , 2013

A. RENCANA ASESMEN DAN EVALUASI (RAE)

D. ASSESSMENT AND EVALUATION PLAN

	RENCANA ASSESSMENT & EVALUASI *Assesment and Evaluation Plan* Prodi Sarjana Statistika/ *Statistics Bachelor* **MK DATA MINING/***DATA MINING COURSE*		**RA&E** SLK-28
Kode: KS184645	**Bobot sks** (T/P): 3 *CREDITS : 3*	**Rumpun MK**: Statistika Komputasi *Course group:* *Computational Statistics*	Smt: VI *Semester VI*
OTORISASI	**Penyusun** *Author* Dr. Santi Wulan Purnami, S.Si, M.Si.	**Koordinator RMK** *Coordinator* Prof. NUR Iriawan	**Kaprodi** *Head of Department* Dr. Kartika Fithriasari, M.Si

Mg ke (1)	Sub CP-MK (2)	Bentuk Asesmen (Penilaian) (3)	Bobot (%) (4)
1,2	1. Dapat menjelaskan konsep-konsep dasar data mining dan aplikasinya *1. Can explain the basic concepts of data mining and their applications*	Tugas, Latihan Soal, Laporan Praktikum *Assignments, Practice Questions, Practicum Report*	10% /10%
3,4	2.Dapat melakukan data integration, transformation, data reduction dan data discretization *2. Can perform data integration, transformation, data reduction and data discretization*	Tugas, Latihan Soal, Laporan Praktikum *Assignments, Practice Questions, Practicum Report*	10% /20%
5	3.Dapat mendeteksi adanya data missing values dan noisy serta dapat mengatasinya *3. It can detect data missing values and noisy and can solve it*	Tugas, Latihan Soal, Laporan Praktikum *Assignments, Practice Questions, Practicum Report*	10% /30%
6	4.Dapat menjelaskan feature selection dan feature extraction dan menerapkannya pada data	Tugas, Latihan Soal, Laporan Praktikum	10% /40%

Mg ke (1)	Sub CP-MK (2)	Bentuk Asesmen (Penilaian) (3)	Bobot (%) (4)
	4. Can explain feature selection and feature extraction and apply it to the data	*Assignments, Practice Questions, Practicum Report*	
7	5.Dapat menjelaskan Mining Associations rule dan recommendation system serta menerapkan pada data *5. Can explain Mining Associations rules and recommendation systems and apply them to data*	Tugas, Latihan Soal, Laporan Praktikum *Assignments, Practice Questions, Practicum Report*	10% /50%
9	6.Dapat menjelaskan konsep unsupervised learning dan menerapkan pada data *6. Can explain the concept of unsupervised learning and apply it to data*	Tugas, Latihan Soal, Laporan Praktikum *Assignments, Practice Questions, Practicum Report*	5% /55%
10	7.Dapat menjelaskan konsep Decision tree dan menerapkannya pada data *7. Can explain the Decision Tree concept and apply it to data*	Tugas, Latihan Soal, Laporan Praktikum *Assignments, Practice Questions, Practicum Report*	5% /60%
11,12	8.Dapat menjelaskan konsep Naïve bayes dan menerapkannya pada data *8. Can explain Naïve Bayes concepts and apply them to data*		10% /70%
13	9.Dapat menjelaskan konsep SVM dan menerapkannya pada data *9. Can explain the SVM concept and apply it to data*	Tugas, Latihan Soal, Laporan Praktikum *Assignments, Practice Questions, Practicum Report*	10% /80%
14	10.Dapat menjelaskan konsep SVR dan menerapkannya pada data *10. Can explain the SVR concept and apply it to data*	Tugas, Latihan Soal, Laporan Praktikum *Assignments, Practice Questions, Practicum Report*	10% /90%
15	11.Dapat menerapkan metode dan menganalisis dengan menggunakan ukuran evaluasi yang sesuai pada problem klasifikasi serta regresi *11. Can apply and analyze methods using appropriate evaluation measures on classification and regression problems*	Tugas, Latihan Soal, Laporan Praktikum *Assignments, Practice Questions, Practicum Report*	10%/100%
		Total bobot penilaian	**100%**

Portofolio penilaian & evaluasi proses dan hasil belajar setiap mahasiswa

Assessment & evaluation portfolio of each student's learning process and outcomes

Nilai terbaik: Mahasiswa 06211640000116

Best grade: Student 06211640000116

Contoh Hitungan capaian CPL

Mg ke	CPL (yg dibebankan pd MK)	CPMK (CLO)	Bentuk Penilaian (Bobot%)*		Bobot (%) CPMK	Nilai Mhs (0-100)	Σ((Nilai Mhs) X (Sub-Bobot%)*)	Ketercapaian CPL pd MK (%)	Diskripsi Evaluasi & Tindak lanjut perbaikan
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)=(5)*(7)	(9)	(10)
1-2	CPL-1	CPMK-1	ETS EAS Kuis1 Praktikum	5% 2,5% 6% 1,2%	**14,7%**	**93** **95** **90** **90**	**4,65** **2,375** **5,4** **1,08**	13,505/14,7% =91,87	**LULUS**

Tabel Bobot Penilaian untuk setiap CPMK pada setiap Assessment (kolom 5 & 6)

	ETS	EAS	Kuis 1	Kuis 2	Praktikum	
CPMK.1	5,0%	2,5%	6,0%	0,0%	1,2%	14,7%
CPMK.3	5,0%	3,8%	7,0%	0,0%	1,4%	17,2%
CPMK.4	5,0%	3,8%	0,0%	6,0%	1,4%	16,2%
CPMK.5	5,0%	3,8%	5,0%	6,0%	1,2%	21,0%
CPMK.6	0,0%	3,8%	0,0%	4,0%	1,2%	9,0%
CPMK.7	0,0%	2,5%	0,0%	0,0%	1,2%	3,7%
CPMK.8	5,0%	2,5%	2,0%	2,0%	1,2%	12,7%
CPMK.9	0,0%	2,5%	0,0%	2,0%	1,2%	5,7%

NILAI untuk setiap Assessment (Kolom 7)

NRP Mahasiswa	ETS	EAS	Kuis 1	Kuis 2	Praktikum
	25%	25%	20%	20%	10%
6211640000013	75	90	87	75	68
6211640000053	70	86	87	80	95
6211640000083	70	86	90	80	90
6211640000063	70	80	88	88	95
6211640000126	70	88	88	80	91
6211640000096	70	85	88	84	93
6211640000041	78	85	88	82	81
6211640000011	70	90	88	80	93
6211640000106	75	87	88	84	90
6211640000093	70	95	90	80	90
6211640000036	70	90	90	88	90
6211640000121	85	83	88	78	95
6211640000026	70	95	87	86	95
6211640000113	85	88	86	78	95
6211640000006	75	90	88	88	95
6211640000111	80	95	90	82	80
6211640000033	85	95	87	80	90
6211640000103	85	95	90	85	90
6211640000016	90	95	88	85	90
6211640000021	93	90	90	85	95
6211640000076	90	95	88	86	95
6211640000001	90	95	90	88	90
6211640000061	90	95	90	86	95
6211640000066	95	90	90	86	95
6211640000116	93	95	90	86	90

Σ((Nilai Mhs) X (Sub-Bobot%)*) (Kolom 8)

	CPMK.1	CPMK.3	CPMK.4	CPMK.5	CPMK.6	CPMK.7	CPMK.8	CPMK.9
6211640000013	12,036	14,167	12,577	16,791	7,191	3,066	10,056	4,566
6211640000053	12,01	14,145	12,855	17,015	7,565	3,29	10,13	4,89
6211640000083	12,13	14,285	12,785	17,105	7,505	3,23	10,13	4,83
6211640000063	11,92	13,99	13,11	17,32	7,66	3,14	10,16	4,9
6211640000126	12,072	14,234	12,874	17,092	7,592	3,292	10,152	4,892
6211640000096	12,021	14,1495	13,0295	17,2435	7,6635	3,241	10,181	4,921
6211640000041	12,277	14,3815	13,1415	17,3795	7,4395	3,097	10,397	4,737
6211640000011	12,146	14,337	12,977	17,191	7,691	3,366	10,226	4,966
6211640000106	12,285	14,4325	13,3125	17,5325	7,7025	3,255	10,445	4,935
6211640000093	12,355	14,6225	13,1225	17,4425	7,8425	3,455	10,355	5,055
6211640000036	12,23	14,435	13,415	17,735	7,975	3,33	10,39	5,09
6211640000121	12,745	14,8525	13,3725	17,5825	7,3725	3,215	10,785	4,775
6211640000026	12,235	14,4825	13,5525	17,7125	8,1425	3,515	10,475	5,235
6211640000113	12,75	14,9	13,56	17,67	7,56	3,34	10,87	4,9
6211640000006	12,42	14,615	13,735	17,945	8,035	3,39	10,66	5,15
6211640000111	12,735	14,9825	13,6025	17,9425	7,8025	3,335	10,775	4,975
6211640000033	12,925	15,1625	13,8725	18,0425	7,8425	3,455	11,045	5,055
6211640000103	13,105	15,3725	14,1725	18,4925	8,0425	3,455	11,205	5,155
6211640000016	13,235	15,4825	14,4225	18,6425	8,0425	3,455	11,415	5,155
6211640000021	13,44	15,655	14,455	18,765	7,915	3,39	11,54	5,09
6211640000076	13,295	15,5525	14,5525	18,7625	8,1425	3,515	11,495	5,235
6211640000001	13,355	15,6225	14,6025	18,9225	8,1625	3,455	11,515	5,215
6211640000061	13,415	15,6925	14,5525	18,8625	8,1425	3,515	11,535	5,235
6211640000066	13,54	15,755	14,615	18,925	7,955	3,39	11,66	5,11
6211640000116	13,505	15,7725	14,6325	18,9525	8,0825	3,455	11,625	5,175

Ketercapaian CPL pd MK (%) (jika ≥70, maka lulus) (Kolom 9)

	CPMK.1	CPMK.3	CPMK.4	CPMK.5	CPMK.6	CPMK.7	CPMK.8	CPMK.9	Keterangan
6211640000013	81,87755	82,60641	77,87616	80,14797	80,34637	82,86486	79,1811	80,10526	LULUS SEMUA CPMK
6211640000053	81,70068	82,47813	79,59752	81,21718	84,52514	88,91892	79,76378	85,78947	LULUS SEMUA CPMK
6211640000083	82,51701	83,29446	79,16409	81,64678	83,85475	87,2973	79,76378	84,73684	LULUS SEMUA CPMK
6211640000063	81,08844	81,57434	81,17647	82,67303	85,58659	84,86486	80	85,96491	LULUS SEMUA CPMK
6211640000126	82,12245	82,99708	79,71517	81,58473	84,82682	88,97297	79,93701	85,82456	LULUS SEMUA CPMK
6211640000096	81,77551	82,50437	80,67802	82,30788	85,6257	87,59459	80,16535	86,33333	LULUS SEMUA CPMK
6211640000041	83,51701	83,85714	81,37152	82,95704	83,12291	83,7027	81,86614	83,10526	LULUS SEMUA CPMK
6211640000011	82,62585	83,59767	80,35294	82,05728	85,93296	90,97297	80,51969	87,12281	LULUS SEMUA CPMK
6211640000106	83,57143	84,15452	82,43034	83,68735	86,06145	87,97297	82,24409	86,57895	LULUS SEMUA CPMK
6211640000093	84,04762	85,26239	81,25387	83,25776	87,6257	93,37838	81,53543	88,68421	LULUS SEMUA CPMK
6211640000036	83,19728	84,1691	83,06502	84,65394	89,10615	90	81,81102	89,29825	LULUS SEMUA CPMK
6211640000121	86,70068	86,6035	82,80186	83,92601	82,3743	86,89189	84,92126	83,77193	LULUS SEMUA CPMK
6211640000026	83,23129	84,44606	83,91641	84,54654	90,97765	95	82,48031	91,84211	LULUS SEMUA CPMK
6211640000113	86,73469	86,88047	83,96285	84,34368	84,46927	90,27027	85,59055	85,96491	LULUS SEMUA CPMK
6211640000006	84,4898	85,21866	85,04644	85,65632	89,77654	91,62162	83,93701	90,35088	LULUS SEMUA CPMK
6211640000111	86,63265	87,36152	84,22601	85,64439	87,17877	90,13514	84,84252	87,2807	LULUS SEMUA CPMK
6211640000033	87,92517	88,41108	85,89783	86,12172	87,6257	93,37838	86,9685	88,68421	LULUS SEMUA CPMK
6211640000103	89,14966	89,63557	87,75542	88,26969	89,86034	93,37838	88,22835	90,4386	LULUS SEMUA CPMK
6211640000016	90,03401	90,27697	89,30341	88,98568	89,86034	93,37838	89,88189	90,4386	LULUS SEMUA CPMK
6211640000021	91,42857	91,2828	89,50464	89,57041	88,43575	91,62162	90,86614	89,29825	LULUS SEMUA CPMK
6211640000076	90,44218	90,68513	90,10836	89,55847	90,97765	95	90,51181	91,84211	LULUS SEMUA CPMK
6211640000001	90,85034	91,09329	90,41796	90,3222	91,20112	93,37838	90,66929	91,49123	LULUS SEMUA CPMK
6211640000061	91,2585	91,50146	90,10836	90,0358	90,97765	95	90,82677	91,84211	LULUS SEMUA CPMK
6211640000066	92,10884	91,86589	90,49536	90,33413	88,88268	91,62162	91,81102	89,64912	LULUS SEMUA CPMK
6211640000116	91,87075	91,96793	90,60372	90,46539	90,30726	93,37838	91,53543	90,78947	LULUS SEMUA CPMK

B. CONTOH EVALUASI (ETS DAN EAS)

E. EXAMPLES OF EVALUATION (ETS AND EAS)

EVALUASI TENGAH SEMESTER - *MIDTERM EXAM*
Prodi S1 STATISTIKA FSAD ITS - SEMESTER GENAP 2019/2020
Undergraduate Program Department Of Statistics FSAD ITS- Even Semester 2019/2020

Mata kuliah / Kelas (*Course/Class*)	:	Data Mining/Kelas A,B,C
Hari,Tanggal / *Day,date*	:	Jumat/27 Maret 2020
Sifat ,Waktu / *Kind of Test, Duration*	:	Take home
Dosen / *Lecturer*	:	Santi Wulan P/ Kartika F/Irhamah

Criteria no.5 of 15 Criteria AUN-QA , *Student Assessments : 5.4 The assessments reflect the Expected Learning Outcomes(ELO) and the content of the programme 5.6 The assessment arrangements cover the objectives of the Curriculum*

6-FT

ETS ini mengukur 5 dari 8 Capaian Pembelajaran yang harus dicapai dalam mata kuliah ini , yaitu -This *MIDTERM EXAM* measures 5 of 8 Learning Outcomes to be achieved in this course, ie :

No	**Capaian Pembelajaran Mata Kuliah (CP-MK) – *Course Expected Learning outcome (C-ELO)***	***Soal Nomor***
CPMK-1	Dapat menjelaskan konsep-konsep dasar data mining dan aplikasinya	1,2
CPMK-3	Mampu menjelaskan prosedur mining data mulai dari pre-processing sampai menyajikan informasi	1,2
CPMK-4	Mampu mengindentifikasi, memformulasi, dan menyelesaikan masalah statistika menggunakan teknik dalam Data Mining	1,2
CPMK-5	Mampu menggunakan teknik komputasi dan perangkat komputer modern yang diperlukan dalam Data Mining	1,2
CPMK-8	Memiliki tanggung jawab dan etika profesi	1,2

1. Carilah dataset dengan kriteria sebagai berikut:
   - Minimal banyaknya data n = 500
   - Minimal banyaknya fitur 10
   - Data bisa diambil dari sumber mana saja (UCI Machine Learning, Kaggle, *website* pemerintah, dll)

   Dari dataset tersebut, lakukan *mining* data (Gunakan software Python dan R) sebagai berikut:
   a. Deteksi adanya *missing values*
   b. Deteksi adanya *outlier*
   c. Buat *summary statistics and visualization* serta jelaskan informasi yang penting
   d. Lakukan analisis *clustering*, jelaskan hasilnya serta beri kesimpulan
   e. Lakukan *feature extraction* menggunakan *Principal Componen Analysis (PCA).* Jika peneliti menginginkan minimal 80% varians data bisa dijelaskan oleh *principal component* (PC), berapa PC yang harus diambil? Jelaskan
2. Lakukan analisis *association rule* menggunakan algoritma Apriori pada data **Online Retail**. Data tersedia di link berikut: https://intip.in/etsdatmin2.

Pengumpulan hasil pengerjaan ETS:

1. Analisis yang telah dilakukan ditulis dalam bentuk paper (dalam word) dengan mengikuti format POMITS (http://ejurnal.its.ac.id/index.php/sains_seni/about/submissions#authorGuidelines).
2. Mengumpulkan semua data pendukung yang meliputi:
   - Dataset asli (dalam excel)
   - Syntax dan hasil output
3. Pengumpulan hasil pengerjaan ETS:
   - Waktu pengumpulan paling lambat tanggal 3 April 2020, jam 23.59.
   - Cara pengumpulan melalui MyITSclassroom ke dosen pengampu masing-masing.
     Kelas A: Dr. Santi Wulan Purnami
     Kelas B: Dr. Kartika F
     Kelas C: Dr. Irhamah

Soal No	1	2	3	4	5	6	Skor total
Skor	75	25					100

DoS-ITS mempunyai 10 Dokumen utama dalam proses perkuliahan, yaitu : empat Dokumen : CP, RP, RE, UT & R, tiga buah SOP: PBS,PCS & PK dan tiga Formulir Rekaman : FT, PA,DN & RN
DoS-ITS has 10 primary documents in the lecture, ie: four documents: CP, RP, RE, UT & R, three SOP, ie: pbs, PCS & PK and three Recording Form, ie: FT, PA & RN

1-	2-RP	3-RE	4-UT	4A-R	5-PBS	6-FT	✓	7PCS	8-PA	9-PK.	10-RN

*CG=Course Group, SI-ISC = Statistika Industri – Industrial statistcs Courses *Group- 27/03/2015 16:48 H4*

Soal Sudah Sesuai CP
The content of the test has been confirmed with ELO

Surabaya, ...
EXAMINATION COMMITTEE OF STATISTICS Department - ITS

Koord RMK/*Coord Of CG** : SI - *ISC*

(.....)
NIP.....

TT/*SIGN*

ETS ini mengukur 5 dari 8 Capaian Pembelajaran yang harus dicapai dalam mata kuliah ini , yaitu -This *MIDTERM EXAM* measures 5 of 8 Learning Outcomes to be achieved in this course, ie :

No	**Capaian Pembelajaran Mata Kuliah (CP-MK) – *Course Expected Learning outcome (C-ELO)***	***Soal Nomor***
CPMK-1	Dapat menjelaskan konsep-konsep dasar data mining dan aplikasinya	1,2
CPMK-3	Mampu menjelaskan prosedur mining data mulai dari pre-processing sampai menyajikan informasi	1,2
CPMK-4	Mampu mengindentifikasi, memformulasi, dan menyelesaikan masalah statistika menggunakan teknik dalam Data Mining	1,2
CPMK-5	Mampu menggunakan teknik komputasi dan perangkat komputer modern yang diperlukan dalam Data Mining	1,2
CPMK-6	Memiliki pengetahuan tentang isu terkini dan mendatang yang berkaitan dengan bidang Data Mining	1,2
CPMK-7	Mampu berkomunikasi secara efektif dan bekerjasama dalam tim yang interdisiplin	1,2
CPMK-8	Memiliki tanggung jawab dan etika profesi	1,2
CPMK-9	Mampu memotivasi diri untuk berpikir kreatif dan belajar sepanjang hayat	1,2

1. Look for a dataset with the following criteria:
- Minimum amount of data n = 500
- Minimum number of features 10
- Data can be retrieved from any source (UCI Machine Learning, Kaggle, government websites, etc.)
From the dataset, do data mining (Use Python and R software) as follows:
a. Detect missing values
b. Outliers detection
c. Create summary statistics and visualization and explain important information
d. Perform a clustering analysis, explain the results and give conclusions
e. Perform feature extraction using Principal Component Analysis (PCA). If the researcher wants at least 80% of the data variance to be explained by the principal component (PC), how many PCs must be taken? Explain
2. Perform an analysis of the association rule using the Apriori algorithm on Online Retail data. Data is available at the following link: https://intip.in/etsdatmin2.

Collection of ETS work results:
1. The analysis that has been carried out is written in the form of a paper (in word) following the POMITS format (http://ejurnal.its.ac.id/index.php/sains_seni/about/submissions#authorGuidelines).
2. Collect all supporting data which includes:
- Original dataset (in excel)
- Syntax and output results
3. Collection of ETS results:
- Collection time is no later than April 3, 2020, at 23.59.
- How to collect through MyITSclassroom to each lecturer.
Class A: Dr. Santi Wulan Purnami
Class B: Dr. Kartika F
Class C: Dr. Irhamah

Final Project: Dikerjakan secara kelompok (1 tim terdiri 2 orang)

1. Carilah dataset dengan kriteria sebagai berikut:
   - Minimal banyaknya data n = 500
   - Minimal banyaknya fitur 10
   - Problem klasifikasi biner
   - Data bisa diambil dari sumber mana saja (UCI Machine Learning, Kaggle, *website* pemerintah, dll)
2. Dari dataset tersebut, lakukan *mining* data (Gunakan software Python dan R) sebagai berikut:
   a. Jelaskan problem data tersebut
   b. Buat analisis yang meliputi:
      - preprocessing,
      - *summary statistics and visualization* serta jelaskan informasi yang penting
      - *feature selection/extraction*,
      - Lakukan analisis *classification* minimal 2 metode
      - Lakukan training-testing: *repeated holdout* dan *k-fold CV*
      - Bandingkan hasilnya menggunakan kriteria : akurasi, sensitifitas, spesifitas, ROC, AUC dan berikan kesimpulan

Pengumpulan hasil pengerjaan EAS:

4. Analisis yang telah dilakukan dikumpulkan dalam bentuk:
   - Slide PPT dan video presentasi durasi maksimum 10 menit
   - Paper (dalam word) dengan mengikuti format POMITS (http://ejurnal.its.ac.id/index.php/sains_seni/about/submissions#authorGuidelines).
5. Mengumpulkan semua data pendukung yang meliputi:
   - Dataset asli (dalam excel)
   - Syntax dan hasil output
6. Pengumpulan hasil pengerjaan EAS:
   - Waktu pengumpulan paling lambat tanggal 22 Mei 2020, jam 23.59.
   - Cara pengumpulan melalui MyITSclassroom ke dosen pengampu masing-masing.
     Kelas A: Dr. Santi Wulan Purnami
     Kelas B: Dr. Kartika F
     Kelas C: Dr. Irhamah
7. Kriteria penilaian
   a. Kreatifitas menyelesaikan problem dan menyajikan informasi (dari PPT) – Bobot 25%
   b. Kedalaman menyelesaikan problem (hasil analisis) – Bobot 60%
   c. Kerjasama tim (dari video presentasi) – Bobot 15%

Final Project: Worked in groups (1 team consisting of 2 people)

1. Look for a dataset with the following criteria:
- Minimum amount of data n = 500
- Minimum number of features 10
- Binary classification problem
- Data can be retrieved from any source (UCI Machine Learning, Kaggle, government websites, etc.)
2. From the dataset, do data mining (Use Python and R software) as follows:
a. Describe the data problem
b. Create an analysis that includes:
- preprocessing,
- summary statistics and visualization and explain important information
- feature selection / extraction,
- Perform a classification analysis of at least 2 methods
- Perform training-testing: repeated holdout and k-fold CV
- Compare the results using criteria: accuracy, sensitivity, specificity, ROC, AUC and provide conclusions

Collection of EAS work results:
4. The analysis that has been carried out is collected in the form of:
- PPT slides and presentation videos with a maximum duration of 10 minutes
- Paper (in word) following the POMITS format (http://ejurnal.its.ac.id/index.php/sains_seni/about/submissions#authorGuidelines).
5. Collect all supporting data which includes:
- Original dataset (in excel)
- Syntax and output results
6. Collection of EAS work results:
- Collection time is no later than May 22, 2020, at 23.59.
- How to collect through MyITSclassroom to each lecturer.
Class A: Dr. Santi Wulan Purnami
Class B: Dr. Kartika F
Class C: Dr. Irhamah

7. Assessment criteria
a. Creativity solving problems and presenting information (from PPT) - Weight 25%
b. Depth of problem solving (analysis result) - Weight 60%
Teamwork (from video to presentation) - Weight 15%