

MODULE HANDBOOK

STATISTICAL MACHINE LEARNING



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

ENDORSEMENT PAGE



MODULE HANDBOOK STATISTICAL MACHINE LEARNING 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.rer.pol. Dedy Dwi Prastyo, S.Si, M.Si	Dosen Lecturer		
Pemeriksa dan Pengendalian <i>Review and Control</i>	Dr.rer.pol. Dedy Dwi Prastyo, S.Si, M.Si; Dr. Kartika Fithriasari, M.Si	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

STATISTICAL MACHINE LEARNING

Module name	STATISTICAL MACHINE LEARNING	
Module level	Undergraduate	
Code	SS234526	
Course (if applicable)	STATISTICAL MACHINE LEARNING	
Semester	5	
Person responsible for the module	Dr.rer.pol. Dedy Dwi Prastyo, S.Si, M.Si	
Lecturer	Dr.rer pol. Dedy Dwi Prastyo, S.Si, M.Si Dr. Dra. Kartika Fithriasari, M.Si	
Language	Bahasa Indonesia and English	
Relation to curriculum	Undergraduate degree program, mandatory, 5th semester.	
Type of teaching, contact hours	Other SCL Methods (87.5%) Non-SCL Methods (12.5%)	
Workload	1. Lectures[L]: 2 x 50 = 100 minutes per week. 2. Practicum in Laboratory [P]: 1x150 = 150 minutes perweek 3. Exercises and Assignments [EA]: 3 x 60 = 180 minutes (3 hours)per week. 4. 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. Understand and able to explain the concept of supervised and unsupervised in machine learning and its application in various fields.</p> <p>CLO-2. Able to identify, formulate, and solve statistical problems using machine learning.</p> <p>CLO-3. Able to apply computing techniques and to use modern computer tools/software used in machine learning for clustering.</p> <p>CLO-4. Able to apply computational techniques and to use modern computer tools/software used in machine learning for predictions of regression and classification.</p> <p>CLO-5. Able to apply computational techniques and to use modern computer tools/software</p>	<p>PLO-2</p> <p>PLO-7</p> <p>PLO-8</p> <p>PLO-9</p> <p>PLO-10</p>

	used in machine learning for time series forecasting. CLO-6. Able to write a written report of the analysis obtained from project.	
Content	The Statistical Machine Learning (SML) course equips students to master the latest developing methods and algorithms that are used to make computers capable of learning and behaving intelligently. This lecture will discuss theory and practice for the latest methods and algorithms with topics including unsupervised learning and supervised learning methods/algorithms for regression, classification, and time series forecasting.	
Assessment and its weight	Assignment 1 (20%) Project 1 – Midterm Exam (20%) Assignment 2 (20%) Project 2 – Final Exam (40%)	
Media employed	LCD, whiteboard, websites (myITS Classroom), zoom	
Reading list	<ol style="list-style-type: none"> 1. Hastie, T., Tibshirani, R., and Friedman, J., 2017, <i>The Elements of Statistical Learning: Data Mining, Inference, and Prediction</i>, Second Edition, Springer New York 2. Haykin, S. 1999, <i>Neural Networks, 2nd .</i>, ed., Prentice Hall 3. Fausett, L., 1994, <i>Fundamental of Neural Networks</i>, Prentice Hall 4. Limin Fu, 1994, <i>Neural Network in Computer Intelligence</i>, McGraw Hill 5. Sivanandam, S.N., Sumathi, S., and Deepa, S. N., 2006, <i>Introduction to Neural Networks using MATLAB 6</i>, McGraw-Hill 6. James, G., Witten, D., Hastie, T., and Tibshirani, R., 2014, <i>An Introduction to Statistical Learning (with Application in R)</i>, Springer. 7. Cristianini, N and Shawe-Taylor, J., 2000, <i>An Introduction to Support Vector Machines and Other Kernel-based Learning Methods</i>, 1st Edition, Cambridge University Press. 8. Goodfellow, I., Yoshua, B., and Courville, A., 2016. <i>Deep Learning</i>. 9. Haerdle, W.K., Prastyo, D.D., Hafner, C.M. (2014). "Support vector machines with evolutionary model selection for default prediction." In: Racine, J., Su, L., Ullah, A. (eds.). <i>The Oxford Handbook of Applied Nonparametric and Semiparametric Econometrics and Statistics</i>, pp. 346–373. Oxford University Press, New York. 10. Berry, M., Mohamed, A., Yap, B. (eds). 2020. <i>Supervised and Unsupervised Learning for Data Science</i>. Springer. 	



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>
STATISTICAL MACHINE LEARNING / <i>STATISTICAL MACHINE LEARNING</i>	SS234526	ANDEF	T=3	P=3	V	11 January 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.rer.pol. Dedy Dwi Prastyo, S.Si, M.Si		Dr. Ir. Setiawan, M.S		Dr. Kartika Fithriasari, M.Si	
Capaian Pembelajaran (CP)/ <i>Learning Achievement</i>	CPL-PRODI yang dibebankan pada MK/ <i>PLO</i>					
	CPL-2	Mampu mengkaji dan memanfaatkan ilmu pengetahuan dan teknologi dalam rangka mengaplikasikannya pada bidang Statistika, serta mampu mengambil keputusan secara tepat dari hasil kerja sendiri maupun kerja kelompok dalam bentuk laporan tugas akhir atau bentuk kegiatan pembelajaran lain yang luarannya setara dengan Tugas Akhir melalui pemikiran logis, kritis, sistematis dan inovatif.				
	CPL-7	Mampu menggunakan perangkat komputasi modern untuk menyelesaikan permasalahan statistik.				
	CPL-8	Mampu menggunakan teknik komputasi 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.				
	PLO-2	<i>Able to study and utilize science and technology in order to apply it to the field of Statistics, and be able to make appropriate decisions from the results of their own work or group work in the form of final project reports or other forms of learning activities whose output is equivalent to the Final Project through logical, critical thinking, systematic and innovative.</i>				
	PLO-7	<i>Able to use modern computing devices to solve statistical problems.</i> <i>Able to use computational techniques to solve statistical problems.</i>				

PLO-8 PLO-9 PLO-10	<i>Able to apply statistical methods to analyze theoretical and real problems.</i> <i>Able to apply business, industrial, economic, social, environmental or health statistical methods to real problems</i>
Capaian Pembelajaran Mata Kuliah (CPMK)/ CLO	
<p>CPMK-1. Mampu memahami konsep <i>supervised</i> dan <i>unsupervised</i> pada pembelajaran mesin (<i>Machine Learning</i>) dan aplikasinya di berbagai bidang.</p> <p>CPMK-2. Mampu mengidentifikasi, memformulasi, dan menyelesaikan masalah statistika menggunakan machine learning.</p> <p>CPMK-3. Mampu menerapkan teknik komputasi dan menggunakan perangkat komputer modern yang digunakan dalam <i>Machine Learning</i> untuk pengelompokan (<i>clustering</i>).</p> <p>CPMK-4. Mampu menerapkan teknik komputasi dan menggunakan perangkat komputer modern yang diperlukan dalam <i>Machine Learning</i> untuk prediksi pada permasalahan regresi dan klasifikasi.</p> <p>CPMK-5. Mampu menerapkan teknik komputasi dan menggunakan perangkat komputer modern yang diperlukan dalam <i>Machine Learning</i> untuk peramalan deret waktu.</p> <p>CPMK-6. Mampu menyajikan hasil penelitian dalam bentuk laporan tertulis.</p> <p><i>CLO-1. Understand and able to explain the concept of supervised and unsupervised in machine learning and its application in various fields.</i></p> <p><i>CLO-2. Able to identify, formulate, and solve statistical problems using machine learning.</i></p> <p><i>CLO-3. Able to apply computing techniques and to use modern computer tools/software used in machine learning for clustering.</i></p> <p><i>CLO-4. Able to apply computational techniques and to use modern computer tools/software used in machine learning for predictions of regression and classification.</i></p> <p><i>CLO-5. Able to apply computational techniques and to use modern computer tools/software used in machine learning for time series forecasting.</i></p> <p><i>CLO-6. Able to write a written report of the analysis obtained from project.</i></p>	

		Matrik CPL – CPMK <i>PLO-CLO Matrix</i>					
		CPMK	CPL-2	CPL-7	CPL-8	CPL-9	CPL-10
		CPMK-1				V	V
		CPMK-2				V	V
		CPMK-3		V	V		V
		CPMK-4		V	V		V
		CPMK-5		V	V		V
		CPMK-6	V				
Deskripsi Singkat MK/ Course Description	<p>Mata kuliah Machine Learning (SML) membekali mahasiswa untuk menguasai metode dan algoritma yang berkembang terkini yang digunakan untuk membuat komputer dapat melakukan pembelajaran dan berperilaku cerdas. Pada perkuliahan ini akan dibahas teori dan praktik untuk metode dan algoritma terkini dengan topik mencakup metode/algoritma unsupervised learning dan supervised learning untuk regresi, klasifikasi, dan peramalan deret waktu.</p> <p><i>The Machine Learning (SML) course equips students to master the latest developing methods and algorithms that are used to make computers capable of learning and behaving intelligently. This lecture will discuss theory and practice for the latest methods and algorithms with topics including unsupervised learning and supervised learning methods/algorithms for regression, classification, and time series forecasting.</i></p>						
Bahan Kajian: Materi Pembelajaran/ Course Material	<p>Teknik Komputasi Modern, Perangkat Komputasi Modern, Metode dan Pemodelan, Aplikasi di Berbagai Bidang (Lab)</p> <p><i>Modern Computing Techniques, Modern Computing Tools, Methods and Modeling, Applications in Various Fields (Lab)</i></p>						
Pustaka/ References	Utama/Primary:						
	Hastie, T., Tibshirani, R., and Friedman, J., 2017, <i>The Elements of Statistical Learning: Data Mining, Inference, and Prediction</i> , Second Edition, Springer New York						
	Pendukung/Secondary:						
		<ol style="list-style-type: none"> Haykin, S. 1999, <i>Neural Networks</i>, 2nd ., ed., Prentice Hall Fausett, L., 1994, <i>Fundamental of Neural Networks</i>, Prentice Hall Limin Fu, 1994, <i>Neural Network in Computer Intelligence</i>, McGraw Hill Sivanandam, S.N., Sumathi, S., and Deepa, S. N., 2006, <i>Introduction to Neural Networks using MATLAB 6</i>, McGraw-Hill James, G., Witten, D., Hastie, T., and Tibshirani, R., 2014, <i>An Introduction to Statistical Learning (with Application in R)</i>, 					

	<p>Springer.</p> <p>6. Cristianini, N and Shawe-Taylor, J., 2000, <i>An Introduction to Support Vector Machines and Other Kernel-based Learning Methods</i>, 1st Edition, Cambridge University Press.</p> <p>7. Goodfellow, I., Yoshua, B., and Courville, A., 2016. <i>Deep Learning</i>.</p> <p>8. Haerdle, W.K., Prastyo, D.D., Hafner, C.M. (2014). "Support vector machines with evolutionary model selection for default prediction." In: Racine, J., Su, L., Ullah, A. (eds.). <i>The Oxford Handbook of Applied Nonparametric and Semiparametric Econometrics and Statistics</i>, pp. 346–373. Oxford University Press, New York.</p> <p>9. Berry, M., Mohamed, A., Yap, B. (eds). 2020. <i>Supervised and Unsupervised Learning for Data Science</i>. Springer.</p>
Dosen Pengampu/ Lecturers	<p>Dr.rer pol. Dedy Dwi Prastyo, S.Si, M.Si</p> <p>Dr. Dra. Kartika Fithriasari, M.Si</p>
Matakuliah syarat/ Pre-requisite Course	<p>Analisis Multivariat Terapan</p> <p><i>Applied Multivariate Analysis</i></p>

