	Universitas Brawijaya **Faculty of Mathematics and Natural Sciences** **Department of Statistics / Bachelor Statistics Study Programme**

Module Handbook		
Module Name:	Optimization Technique (MAS61134)	
Module Level:	Bachelor	
Abbreviation, if applicable:	-	
Sub-heading, if applicable:	-	
Courses included in the module, if applicable:	-	
Semester/term:	5th / ThirdYear	
Module Coordinator(s):	Achmad Efendi, S.Si., M.Sc., PhD	
Lecturer(s):	Achmad Efendi, S.Si., M.Sc., PhD; Dwi Ayu Lusia, S.Si., M.Si.	
Language:	Indonesian	
Classification within the curriculum:	Elective Course	
Teaching format / class per week during semester:	2 × 50 minutes	
Workload:	1.67 hours lectures, 2 hours structural activities, 2 hours individual studies, 16 weeks per semester, and total 90.67 hours per semester 3 ECTS	
Credit Points:	2	
Requirements:	Introduction to Numerical Analysis (MAS62114), Introduction to Regression Analysis (MAS62122)	
Learning goals / competencies:	**General Competence (Knowledge):**	
	ILO1	The students are able to master basic scientific concepts and statistical analysis methods applied on computing, social science, humanities, economics, industry and life science.
	ILO4	The students are able to master at least two statistical softwares, including based on open source.
	ILO5	The students are able to apply logical, critical, systematic, and innovative thinking independently when applied to science and technology that contain humanities values, based on scientific principles, procedures and ethics with excellent and measurable results.
	ILO6	The students are able to take appropriate decisions to solve the problems expertly, based on the information and data analysis.

	ILO7	The students are able to improve and develop a job networks, then supervise and evaluate the team's performance they lead.
	ILO8	The students are able to apply and internalize the spirit of independence, struggle, entrepreneurship, based on values, norms, and academic ethics of Pancasila in all aspects of life.
	Specific Competence:	
	M1	Students are able to understand the basic concepts of non-linear programming (NLP) (ILO1, ILO3, ILO5, ILO6)
	M2	Students are able to solve single variable NLP problem (ILO1, ILO3, ILO5, ILO6)
	M3	Students are able to solve NLP problems with several variables without or with constraints (ILO1, ILO3, ILO5, ILO6)
	M4	Students are able to solve specific NLP problems (ILO1, ILO3, ILO5, ILO6)
	M5	Students are able to convey the results of their modeling and analysis in writing or verbally, in the form of individual or group assignments (ILO3, ILO7, ILO8)
Contents:	1	The concept of nonlinear programming
	2	Convex and concave functions
	3	Solving single variable NLP
	4	Golden Section Search
	5	NLP without Constraints with Multiple Variables
	6	Optimization with equality constraints
	7	Optimization with inequality constraints
	8	Quadratic Programming
	9	Separable Programming
	10	Stochastic Programming
Soft skill attribute:	Responsible, independently, and discipline	
Study/exam achievement:	Final score (NA) is calculated as follow: 15% Assignments, 20% Quizzes, 30% Midterm Exam, 30% Final Exam, 5% Attitude Final index is defined as follow: A : > 80 - 100 B+ : > 75 - 80 B : > 69 - 75 C+ : > 60 - 69 C : > 55 - 60	

	D+ : > 50 - 55 D : > 44 - 50 E : 0 - 44
Forms of media:	Software(R, SPSS), LCD projector, whiteboard
Learning methods:	Lecture, assessments, and discussion
Literature:	Main:
	1. Winston,W.1994, Operation and Research. Aplication ang Algorithm. Duxburry Pres
	Support:
	1. Bazara, MS.HD. Sekrali dan C. M. Shetty. Now, learning theory and algorhytm. John Wiley and Sons, New York, USA
	2. Mital, K. V. Optimal Method in Operation Research and Analisys. Wiley Easted, New York
	3. Taha, H.A.1996. Riset Operasi. Suatu Pengantar, Jilid 2. Binarupa Aksara. Jakarta
Notes:	