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

Module Handbook

Module Name:	Simulation Methods (MAS62321)
Module Level:	Bachelor
Abbreviation, if applicable:	-
Sub-heading, if applicable:	-
Courses included in the module, if applicable:	-
Semester/term:	4th / Second Year
Module Coordinator(s):	Rahma Fitriani, S.Si., M.Sc. PhD
Lecturer(s):	Rahma Fitriani, S.Si., M.Sc. PhD
	Darmanto, 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 Probability Theory (MAS62111), Basics of programming (MAS61131)
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.
	ILO2	The students are able to arrange and/or choose an efficient data collection/ data generated design that applies in surveys, experiments or simulations.
	ILO3	The students are able to manage, analyze, and complete the real case using statistical method on computing, social humanities, economics, industry and life science that helped by software, then present and communicate the results.
	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 monte carlo simulation concept, deterministic simulation models and stochastic simulation models (ILO1, ILO5)
	M2		Students are able to understand the concept of generating random numbers that have discrete or continuous distribution (ILO1, ILO2, ILO5)
	M3		Students are able to apply the concept of simulation with the help of software (R) (ILO2, ILO4, ILO5)
	M4		Students are able to apply simulation concepts to determine solutions to simple queuing models (ILO1, ILO2, ILO3, ILO4, ILO5)
	M5		Students are able to apply simulation concepts to determine solutions to simple queuing models (ILO1, ILO2, ILO3, ILO4, ILO5)
	M6		Students are able to understand the properties of the simulation output statistically (ILO3, ILO4, ILO6)
	M7		Students are able to apply simulation concepts to statistical models (ILO1, ILO2)
	M8		Students are able to convey the results of their analysis in writing or verbally, in the form of individual or group assignments (ILO7, ILO8)
Contents:	1		Basic Terminology of Monte Carlo Simulation, Deterministic Simulation Models and Stochastic Simulation Models
	2		The concept of generating random numbers that spread discrete or continuous
	3		Simulation for determining the solution to the queuing

		model
	4	Simulation for determining the solution in the preparation model
	5	The statistical output properties of the simulation
	6	Simulation on statistical models
Soft skill attribute:	Responsible, independently, and discipline	
Study/exam achievement:	Final score (NA) is calculated as follow: 20% Assignments, 12% Post Test, 15% Quizzes, 26% Midterm Exam, 26% Final Exam. 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:	-	
Learning methods:	Lecture and assessment	
Literature:	**Main:**	
	Winston, W.L. 2004. Operation Research: Applications and Algorithms. 4th ed. Thomson Brooks/Cole. Southbank, Vic	
	Support:	
	1. Morgan, B.J.T. 1984. Elements of simulation	
	2. Law, A.M. and Kelton, W. 1991. Simulation Modelling and Analysis	
	3. Kakiay, T.J. 2004. Pengantar Sistem Simulasi	
Notes:		