	Universitas Brawijaya **Faculty of Mathematics and Natural Sciences** **Department of Statistics / Bachelor Statistics Study Programme**
Module Handbook	
Module Name:	Stochastic Process (MAS61115)
Module Level:	Bachelor
Abbreviation, if applicable:	-
Sub-heading, if applicable:	-
Courses included in the module, if applicable:	-
Semester/term:	3rd / Second Year
Module Coordinator(s):	Dr. Suci Astutik S.Si., M.Si.
Lecturer(s):	Dr. Suci Astutik S.Si., M.Si.
	Ir. Heni Kusdarwati, MS
	Dr. Eni Sumarminingsih, S.Si., M.M.
	Nurjannah, S.Si., M.Phil, Ph.D
Language:	Indonesian
Classification within the curriculum:	Elective course
Teaching format / class per week during semester:	3 × 50 minutes
Workload:	2.5 hours lectures, 3 hours structural activities, 3 hours individual studies, 16 weeks per semester, and total 136 hours per semester 4.5 ECTS
Credit Points:	3
Requirements:	Introduction to Probability Theory (MAS62111)
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.
	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.
	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 and explain the basic concepts of probability theory and its properties, the distribution of discrete and continuous random variables, conditional probability, and expected values (ILO1, ILO5)
	M2	Students are able to understand, explain, and apply discrete-time Markov chains and their properties: Transition Probability Matrix, first step analysis (ILO1, ILO5, ILO6, ILO8)
	M3	Students are able to understand, explain, and apply Markov Chain Long-term Behavior (ILO1, ILO5, ILO6, ILO8)
	M4	Students are able to understand, explain, and apply the Poisson Process and its properties (ILO1, ILO5, ILO6, ILO8)
	M5	Students are able to understand, explain, and apply a continuous-time Markov chain: the process of birth and death, the process of birth, the process of death (ILO1, ILO5, ILO6, ILO8)
	M6	Students have skills in applying Markov Chain theory and Poisson Process in queuing theory: definitions, propositions, concepts, and applications (ILO1, ILO5, ILO6, ILO8)
Contents:	1	Reviewing probability theory and properties, the distribution of discrete and continue random variables, conditional probability, and expected value
	2	Markov chain for discrete time and properties: Transition probability matrix, first step analysis
	3	Long-term behavior of Markov chain
	4	Poisson process and properties
	5	Markov chain for continue time: birth and death process, birth process, and death process
	6	Queue theory: definition, theorems, concepts, and applications
Soft skill attribute:	Responsible, independently, and discipline	
Study/exam achievement:	Final score (NA) is calculated as follow: 5% Attitude, 10% Tutorial Class, 20% Assignments, 10% Quizzes, 25% Midterm Exam, 30% 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:	Software (Excel, R), LCD projector, whiteboard
Learning methods:	Lecture, assessments, and discussion
Literature:	Main:
	1. Karlin, S & H.M. Taylor, 1994. An Introduction to Stochastic Modeling. 3rd ed. Academic Press. New York.
	2. Ross, Sheldon M, 1996. Stochastic Processes Second Edition, John Willey & Son Inc.
	Support:
	1. Allen. 2003. Introduction to Stochastic Process with Biology Application
	2. Aven, U Jensen. 1999. Stochastic Models in Reliability
	3. Beichelt, Frank, 2016. Applied Probability and Stochastic Processes, 2 edition, CRC Press, New York
Notes:	