

## UNIVERSITAS GADJAH MADA

Faculty of Mathematics and Natural Sciences

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## **Undergraduate Programme in Statistics**

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## **MODULE HANDBOOK**

Website : http://s1stat.fmipa.ugm.ac.id/

Module name	Introduction to Stochastic Processes						
Module level, if applicable	Bachelor						
Code, if applicable	MMS-3002						
Subtitle, if applicable	-						
Courses, if applicable	Introduction to Stochastic Processes						
Semester(s) in which the	5 <sup>th</sup> (fifth)						
module is taught							
Person responsible for the	Chair of the Department of Mathematics						
module							
Lecture(s)	Dr. Irwan Endrayanto A, S.Si., M.Sc						
	Drs. Danardono, MPH., Ph.D.						
Language	Bahasa Indonesia						
Relation to curriculum	Compulsory course in the third year (5th semester) Bachelor Degree						
Type of teaching, contact	150 minutes lectures and 180 minutes structured activities per week.						
hours							
Workload	Total workload is 136 hours per semester, which consists of 150 minutes lectures per						
	week for 14 weeks, 180 minutes structured activities per week, 180 minutes						
	individual study per week, in total is 16 weeks per semester, including mid exam and						
	tinal exam.						
Credit points							
Requirements according to	Studen	Students have taken Introduction to Stochastic Processes course (MMM-3002) and					
the examination regulations	have an examination card where the course is stated on.						
Recommended prerequisites	Studen	its have taken introduction to Probabil	ity Model course (MIMIM-2410) and				
Module objectives /intended	nave p	Students are able to define various tra	ine course.				
learning outcomes	0.1.	the features that distinguish different	types of stochastic processes and explain				
learning outcomes		another	types of stochastic processes from one				
	$CO_2$	Students are able to derive often-used	theoretical properties of stochastic				
	00.2.	processes.	incorenear properties of stoenastie				
	CO.3.	Students are able to apply both analytic	cal and computational techniques to				
	solve stochastic models.						
Content	Week	Topic	Sub-Topic				
	1.	Introduction Stochastic	- Definition and Examples				
		Processes and its applications	- Inter-Arrival and Waiting Time				
	2.	The Poisson Process	Distribution				
	3.		- Non-homogeneous Poisson				
	4.		Process.				
	5.	Discrete Time Markov Chains	- Classification of States				
	6.		- Measure of Stationary Probabilities				
	7.		- Finite Markov Chain				
	8.	Mid-exam	-				
	9.	Discrete Time Markov Chains	- Countable Markov Chain				
	10.	Continuous Time Markov Chains	- Birth and Death Processes				
	11.		- Time reversible				
	12.	Applications to queueing theory	- Regenerative Processes				
1	1.5.	I The Kenewal Theory	I - Applications of the Renewal				

	14.		Theory			
	15.	Brownian Motion and Stationary	- The use of the Brownian motion			
	16.	Final exam	-			
Study and examination	The fit					
requirements and forms of	No	No Assessment methods (components, activities) Weight (percentage)				
examination	1	1 Final Examination 30				
	2	Mid-Term Examination 25				
	3	Presentation 15				
	4	4 Class Activities: Quiz, Homework, etc. 20				
	5	Peer Assessment	10			
	The initial cut-off points for grades A, B, C, and D should not be less than 80%, 70%, 50%, and 40%, respectively.					
Media employed	Projector, board, e-learning via http://elisa.ugm.ac.id					
Reading List	eading List 1. Paul G. Hoel, Sidney C. Port and Charles J. Stone, 1972, Introduction i					
	Processes. Houghton Mifflin Company.					
	2. Randolph Nelson, 1995, Probability, Stochastic Processes and Queueing Theory, The					
	<ul> <li>Mathematics of Computer Performance Modeling, Springer-Verlag.</li> <li>Gregory F. Lawler, 2006, <i>Introduction to Stochastic Processes</i>, Chapman &amp; Probability Series.</li> </ul>					
	4. Sheldon M. Ross, 1996, Stochastic Processes. 2nd edition. John Wiley & Sons Inc.					
	<ol> <li>Shelldon M. Ross, 2010, Introduction to Probability Models. 10th edition. California. Academic Press</li> </ol>					
	6. Wayne L. Winston, 2003, <i>Operations Research: Applications and Algorithms</i> , Duxbury Press.					

## PLO and CO Mapping

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6	PLO 7	PLO 8	PLO 9
CO 1									
CO 2									
CO 3									