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MODULE HANDBOOK

Module name	Introduction to Stochastic Processes		
Module level, if applicable	Bachelor		
Code, if applicable	MMS-3002		
Subtitle, if applicable			
Courses, if applicable			
Semester(s) in which themodule is taught	Second year (odd semester)		
Person responsible for themodule	Chair of the Department of Mathematics		
Lecture(s)	Dr. IrwanEndrayanto A, S.Si., M.Sc Drs. Danardono, MPH., Ph.D.		
Language	Bahasa Indonesia		
Relation to curriculum	Compulsory course in the second year (3rd semester)		
Type of teaching, contact hours	150 minutes lectures and 180 minutes structured activities per week.		
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 final exam.		
Credit points	3 (three)		
Requirementsaccording to the examination regulations	Students have taken Introduction to Stochastic Processes course (MMM-3002) and have an examination card where the course is stated on.		
Recommended prerequisites	Students have taken Introduction to Probability Model course (MMM-2410) and have participated in the final examination of the course.		
Module objectives/intended learning outcomes	CO.1. Students are able to define various types of stochastic processes and explain the features that distinguish different types of stochastic processes from one another. CO.2. Students are able to derive often-used theoretical properties of stochastic processes. CO.3. Students are able to apply both analytical and computational techniques to solve stochastic models.		
Content	Week	Topic	Sub-Topic
	1.	Introduction Stochastic Processes and its applications	-
	2.	The Poisson Process	- Definition and Examples
	3.		- Inter-Arrival and Waiting Time Distribution
	4.		
	5.	Discrete Time Markov Chains	- Non-homogeneous Poisson Process.
	6.		
	7.		- Classification of States
	8.	Mid-exam	- Measure of Stationary Probabilities
	9.	Discrete Time Markov Chains	- Finite Markov Chain
	10.	Continuous Time Markov Chains	-
	11.		- Countable Markov Chain
	12.	Applications to queueing theory	- Birth and Death Processes
	13.	The Renewal Theory	- Time reversible
	14.		-

	15. 16.	Brownian Motion and Stationary Final exam	- Regenerative Processes - Applications of the Renewal Theory - The use of the Brownian motion -
Study and examination requirements and forms of examination	The final mark will be weighted as follows: No Assessment methods (components, activities) Weight (percentage) 1 Final Examination 30 2 Mid-Term Examination 25 3 Presentation 15 4 Class Activities: Quiz, Homework, etc 20 5 Peer Assesment 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	1. Paul G. Hoel, Sidney C. Port dan Charles J. Stone, 1972, *Introduction to Stochastic Processes*. Houghton Mifflin Company. 2. Randolph Nelson, 1995, *Probability, Stochastic Processes and Queueing Theory*, The Mathematics of Computer Performance Modeling, Springer-Verlag. 3. Gregory F. Lawler, 2006, *Introduction to Stochastic Processes,* Chapman & Hall/CRC Probability Series. 4. Sheldon M. Ross, 1996, *Stochastic Processes*. 2nd editon. John Wiley & Sons,Inc. 5. Shelldon M. Ross, 2010, *Introduction to Probability Models*. 10th edition.California. Academic Press 6. Wayne L. Winston, 2003, *Operations Research: Applications and Algorithms,* 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			v		v				v
CO 2			v		v				v
CO 3			v		v				v

3,5,9

PLO 3 are able to develop their logic and mathematical thinking. They are in particular able to formulate mathematical hypotheses and have an understanding of how such hypotheses can be verified or falsified using mathematical methods.

PLO 5 have comprehensive knowledge in mathematical modelling and able to create mathematical models, both in mathematics, in other fields, and in real problems. They are in particular able to solve and determine the strategy how to solve the problems.

PLO 9 have ability to apply their mathematics ability in their carrier related to mathematics and to continue their program in master and doctoral programme.