



UNIVERSITAS GADJAH MADA

Faculty of Mathematics and Natural Sciences

Mathematics Department

Sekip Utara Bulaksumur Yogyakarta 55281 Telp: +62 274 552243 Fax: +62 274 555131 Email: math@ugm.ac.id Website: <http://math.fmipa.ugm.ac.id>

Undergraduate Programme in Statistics

Telp : +62 274 552243

Email : stat.fmipa@ugm.ac.id; kaprodi-s1-statistika.mipa@ugm.ac.id

sekprodi-s1-statistika.mipa@ugm.ac.id

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

MODULE HANDBOOK

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 module is taught	5 th (fifth)																																			
Person responsible for the module	Chair of the Department of Mathematics																																			
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 (5 th semester) Bachelor Degree																																			
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																																			
Requirements according 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	<p>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.</p> <p>CO.2. Students are able to derive often-used theoretical properties of stochastic processes.</p> <p>CO.3. Students are able to apply both analytical and computational techniques to solve stochastic models.</p>																																			
Content	<table border="1"> <thead> <tr> <th>Week</th> <th>Topic</th> <th>Sub-Topic</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td rowspan="4">Introduction Stochastic Processes and its applications</td> <td>- Definition and Examples</td> </tr> <tr> <td>2.</td> <td>- Inter-Arrival and Waiting Time Distribution</td> </tr> <tr> <td>3.</td> <td>- Non-homogeneous Poisson Process.</td> </tr> <tr> <td>4.</td> <td>- Classification of States</td> </tr> <tr> <td>5.</td> <td rowspan="3">Discrete Time Markov Chains</td> <td>- Measure of Stationary Probabilities</td> </tr> <tr> <td>6.</td> <td>- Finite Markov Chain</td> </tr> <tr> <td>7.</td> <td>-</td> </tr> <tr> <td>8.</td> <td>Mid-exam</td> <td>-</td> </tr> <tr> <td>9.</td> <td rowspan="2">Discrete Time Markov Chains</td> <td>- Countable Markov Chain</td> </tr> <tr> <td>10.</td> <td>- Birth and Death Processes</td> </tr> <tr> <td>11.</td> <td rowspan="3">Continuous Time Markov Chains</td> <td>- Time reversible</td> </tr> <tr> <td>12.</td> <td>- Regenerative Processes</td> </tr> <tr> <td>13.</td> <td>- Applications of the Renewal</td> </tr> </tbody> </table>	Week	Topic	Sub-Topic	1.	Introduction Stochastic Processes and its applications	- Definition and Examples	2.	- Inter-Arrival and Waiting Time Distribution	3.	- Non-homogeneous Poisson Process.	4.	- Classification of States	5.	Discrete Time Markov Chains	- Measure of Stationary Probabilities	6.	- Finite Markov Chain	7.	-	8.	Mid-exam	-	9.	Discrete Time Markov Chains	- Countable Markov Chain	10.	- Birth and Death Processes	11.	Continuous Time Markov Chains	- Time reversible	12.	- Regenerative Processes	13.	- Applications of the Renewal	
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