



# UNIVERSITAS GADJAH MADA

Faculty of Mathematics and Natural Sciences

Mathematics Department

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## Doctoral Program in Mathematics

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**MODULE HANDBOOK**  
Doctoral in Mathematics

<b>Module name:</b>	<b>Analisis Data Longitudinal (Longitudinal Data Analysis)</b>												
<b>Module level, if applicable:</b>	Doctoral Program, Master Program												
<b>Code, if applicable:</b>	MMM-5412												
<b>Semester(s) in which the module is taught:</b>	2 (even term)												
<b>Person responsible for the module:</b>	Chair of Statistics Research Group												
<b>Lecturer(s):</b>	1. Drs. Danardono, MPH, Ph.D												
<b>Language:</b>	Indonesia												
<b>Relation to curriculum:</b>	Doctoral Degree in Mathematics, Elective Course												
<b>Credit points:</b>	3 Semester Credit Unit												
	3x50 minutes lectures, 3x60 minutes structured activities.												
<b>Workload:</b>	<ul style="list-style-type: none"> <li>• 3x50 minutes lectures,</li> <li>• 3x60 minutes structured activities,</li> <li>• 3x60 minutes individual study,</li> <li>• In 16 weeks per semester (including assignments and examinations)</li> </ul>												
<b>Recommended prerequisites:</b>	Mathematical Statistics												
<b>Module objectives/intended learning outcomes:</b>	<p>On successful completion of this course, students should be able to:</p> <p>CO1. Identify real world data that can be analyzed using longitudinal data analysis</p> <p>CO2. perform exploratory data analysis for longitudinal data</p> <p>CO3. Explain theory underlying General Linear Models for longitudinal data, perform their statistical analysis and interpret the result of the analysis</p> <p>CO4. Explain theory underlying Generalized Linear Models for longitudinal data, perform their statistical analysis and interpret the result of the analysis</p> <p>CO5. Discriminate between Marginal Model, Random Effect Model and Transitional Model; and perform their statistical analysis and their interpretation.</p>												
<b>Content:</b>	Longitudinal data. Graphical representation and ummary measures for longitudinal data. General Linear Models. Generalized linear models. Marginal Modes, Random Effect Models, Transitional Models.												
<b>Study and examination requirements and forms of examination:</b>	<p>The final mark will be weighted as follows:</p> <table border="1"> <thead> <tr> <th>No</th> <th>Assessment methods (components, activities)</th> <th>Weight (percentage)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Final Examination</td> <td>35%</td> </tr> <tr> <td>2</td> <td>Mid-Term Examination</td> <td>35%</td> </tr> <tr> <td>3</td> <td>Projects/Presentation</td> <td>30%</td> </tr> </tbody> </table> <p>Final grade will be determined as follows: Grade Criteria The initial cut-off points for grades A, B, C, and D should not be less than 80%, 65%, 50%, and 40%, respectively.</p>	No	Assessment methods (components, activities)	Weight (percentage)	1	Final Examination	35%	2	Mid-Term Examination	35%	3	Projects/Presentation	30%
No	Assessment methods (components, activities)	Weight (percentage)											
1	Final Examination	35%											
2	Mid-Term Examination	35%											
3	Projects/Presentation	30%											

<b>Media employed:</b>	Board, LCD Projector, Laptop/ Computer
<b>Reading List:</b>	<ol style="list-style-type: none"> <li>1. Danardono, 2015, Analisis Data Longitudinal. UGM Press</li> <li>2. Diggle, P. J., Heagerty, P., Liang, K-Y., Zeger, S. L. (2002 ) Analysis of Longitudinal Data (Second Edition). Oxford University Press.</li> </ol>

### Mapping of the COs and PLOs

	PLO - 1 S3 Mat	PLO - 2 S3 Mat	PLO - 3 S3 Mat	PLO - 4 S3 Mat	PLO - 5 S3 Mat	PLO -6 S3 Mat
CO 1	X		X		X	
CO 2	X		X		X	
CO 3	X	X	X		X	
CO 4	X	X	X		X	
CO 5	X	X	X		X	

#### Programme Learning Outcomes (PLO) Doctoral Programme in Mathematics

<b>PLO-1</b>	<b>:</b>	<b>Attitude:</b>  Devote to God Almighty, uphold the humanity values, internalize academic values and ethics, responsible in working in the area of expertise independently.
<b>PLO-2</b>	<b>:</b>	<b>Knowledge:</b>  Mastering philosophy of mathematics and one of the fields in mathematics (algebra, analysis, applied mathematics, statistics, computational mathematics, computational statistics).
<b>PLO-3</b>	<b>:</b>	<b>Knowledge:</b>  Able to think logically, analytically, inductively, deductively, and structured; having the ability to manage, lead, and develop research programs independently, and able to communicate the thoughts as well as his work to the scientific community and the general public.
<b>PLO-4</b>	<b>:</b>	<b>Skill:</b>  Creating new concepts and / or new methods (original) in the field of mathematics that are recognized nationally and internationally.
<b>PLO-5</b>	<b>:</b>	<b>Skill:</b>  Able to apply mathematics according to their field of expertise to solve problems including those that require a multidisciplinary, cross-disciplinary, or trans-disciplinary approach.
<b>PLO-6</b>	<b>:</b>	<b>Life Long Learning:</b>  Having lifelong learning skills and adaptive to the development of science and technology, especially in fields related to Mathematics and its applications.