

Faculty of Mathematics and Natural Sciences

Department of Mathematics

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Doctor in Mathematics

Telp	$:+62\ 274\ 552243$
Email	: maths3@ugm.ac.id; kaprodi-s3-matematika.mipa@ugm.ac.id
Website	: http://s3math.fmipa.ugm.ac.id/

Module name:	Topics in Advanced Data Analysis B
Code, if applicable:	MMM 7420
Subtitle, if applicable	
Semester(s) in which the	1 st or 2 nd semester
module is taught:	
Person responsible for the	Chair of Statistics Research Group
module:	
Language:	Bahasa Indonesia
Relation to curriculum:	Elective Course
Teaching methods	Lecture, classroom discussion, project-based learning.
Workload (incl. contact hours,	The total workload is 232 hours per semester, which consists of 50 minutes lectures
self-study hours)	per week, 120 minutes of structured activities per week, and 120 minutes of individual study per week, in total is 16 weeks per semester, including mid and final exams.
Credit points in Credit Units	3
Required and recommended prerequisites for joining the module	The student possesses a good understanding of the fundamentals of Data Analysis.
Module objectives/intended	After completing this course, the students have ability to:
learning outcomes:	CO 1. Mastery of the development of statistical data analysis.
5	CO2. Mastery of the development of time series data analysis.
	CO3. Mastery of the development of panel and spatial data analysis.
Content:	variable function and its properties, Types of survival data (censored,
	truncated, interval censored), Parametric distribution for survival data,
	Non-parametric methods for estimating survival function and cumulative
	hazard function, Parametric Survival Regression Models (AFT and PHM
	parametric), Cox Regression, Counting process approach to event data,
	Multistate models, Frailty models, Additive hazard regression, Advanced
	topics, and related research topics on survival models or survival data
	analysis.
	2 Basic concept of popparametric regression and the difference with
	2. Basic concept of nonparametric regression and the difference with
	annuaches Nonnarametric regression curve estimation with kernel and
	spline approaches. Bandwidth selection in popparametric kernel
	regression. Knot selection in nonparametric spline regression
	Nonnarametric regression with other approaches (Fourier Series) along
	with bandwidth selection. Application of popparametric regression to a
	dataset
Examination forms	Oral presentation, essay, paper
Study and examination	The final mark will be weighted as follows:
requirements and forms of	-

examination:	N	Assessment methods	Weight
	NO	(components, activities)	(percentage)
	1	Final Examination (portfolio/essay/oral presentation)	35%
	2	Mid-Term Examination (portfolio/essay/presentation)	35%
	3	Class Activities: Presentation	30%
	To pas	s the course, the minimum grade is B.	
Media employed:	Board,	LCD Projector, Laptop/Computer	
Reading List:	1. 2. 3. 4. 5. 6. 7. 8. 9. 10	Aalen, O.O., Borgan, O., Gjessing, I History Analysis: A Process Point of Via Andersen, P.K., Borgan, O., Gill, R.D. Models based on Counting Processes. Klein, J. P dan Moeschberger, M Techniques for Censored and Truncate Eubank, R.L. (1988). Spline Smoothing Marcel Dekker Ins, New York. Green, P.J. and Silverman, B.W. (19 and Generalized Linear Models. Chapt Hardle, W. (1990). Applied Nonpara University Press, New York. Hardle, W. (1991). Smoothing Techni Spinger Verlag, New York. Takezawa, K. (2006). Introduction to I Wiley and Sons, Inc., New Jearsy. Thompson, J.R. and Tapia, R.A. (1 Estimation, Modelling and Simulations Wahba, G. (1990). Spline Models Pensylvania.	H.K., 2008, Survival and Event ew. Springer, Berlin. D., Keiding, N., 1993, Statistical Springer, New York. I. L., 2003, Survival Analysis: ed Data, 2nd ed Springer. ; and Nonparametric Regression. 194). Nonparametric Regression man and Hall, London. ametric Regression. Cambridge ques with Implementation in S. Nonparametric Regression. John 1990). Nonparametric Function s. SIAM, Philadelpia. for Observational Data. SIAM,

	PLO-1	PLO-2	PLO-3	PLO-4	PLO-5	PLO –6
	S3 Mat					
CO 1	v	V	v		v	
CO 2	v	V	v		v	
CO 3	v	v	v		v	v

Last Modified Date : February 10, 2024



UNIVERSITAS GADJAH MADA Faculty of Mathematics and Natural Sciences Department of Mathematics Sekip Utara Bulaksumur Yogyakarta 55281 Telp: +62 274 552243 Fax: +62 274 555131 Email: <u>math@ugm.ac.id</u> Website: <u>http://math.fmipa.ugm.ac.id</u>

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Module name:	Topics in Advanced Data Analysis B			
Code, if applicable:	MMM 7420			
Subtitle, if applicable	Statistical Data Mining			
Semester(s) in which the	1 st or 2 nd semester			
module is taught:				
Person responsible for the	Chair of Statistics Research Group			
module:				
Language:	Bahasa Indonesia			
Relation to curriculum:	Doctoral Degree in Mathematics, Elective Course			
Teaching methods	Lecture, classroom discussion, project-based learning.			
Workload (incl. contact hours, self-study hours)	Total workload is 232 hours per semester, which consists of 50 minutes lectures per week, 120 minutes of structured activities per week, 120 minutes of individual study per week, in total is 16 weeks per semester, including mid exam and final exam.			
Credit points in Credit Units	3			
Required and recommended prerequisites for joining the	Students have learned some basic courses in statistics and statistical mathematics course			
module	Students also have some knowledge of statistical software, such as R and Phyton			
Module objectives/intended learning outcomes:	After completing this course, the students have ability to: CO 1. Be able to analyze the theoretical aspect of Statistical data mining related to the doctoral research being studied CO 2. Use software for doing Statistical data mining related to the doctoral research being studied CO 3. Be able to analyze some extended Statistical data mining models and methods related to the doctoral research being studied			
Content:	It will be derived from the research topic of the students. It will be focused on the theory, models, and method of specific data analysis used in the student research.			
Examination forms	Oral presentation, essay, paper			
Study and examination requirements and forms of examination:	The final mark will be weighted as follows:Assessment methodsWeightNo(components, activities)(percentage)1Final Examination (portfolio/essay/oral35%presentation)2Mid-Term Examination35%(portfolio/essay/presentation)35%			
	3 Class Activities: Presentation 30%			
	To pass the source, the minimum grade is P			
Media employed:	Board, LCD Projector, Laptop/Computer			

Reading List:	1. Hastie, T., Tibshirani, R., Friedman, J., 2016, The Elements of
	Statistical Learning (2nd Edition), Springer Verlag, New York
	2. Recent publication on statistical data mining related to the research

	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	v	v	v		v	
CO 2	v	v	v		v	
CO 3	V	V	V		V	V

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MODULE HANDBOOK Doctoral in Mathematics

Module name:	Topik	dalam Analisis Data Statistik Lanjut B		
	(Topic:	s in Advanced Statistical Data Analysis B)		
Code, if applicable:	MMM	MMM 7420		
Subtitle, if applicable	Advan	ced Semiparametric Regression		
Semester(s) in which the module is taught:	1 st or 2	2 nd semester		
Person responsible for the module:	Chair o	of Statistics Research Group		
Language:	Bahasa	a Indonesia		
Relation to curriculum:	Docto	ral Degree in Mathematics, Elective Cours	e	
Teaching methods	Lectur	e, classroom discussion, project-based lea	arning.	
Workload (incl. contact hours, self-study hours)	Total v lecture of ind exam a	workload is 232 hours per semester, whicl es per week, 120 minutes of structured ac ividual study per week, in total is 16 week and final exam.	n consists of 50 minutes tivities per week, 120 minutes s per semester, including mid	
Credit points in Credit Units	3			
Required and recommended prerequisites for joining the module	Studer mathe Studer	nts have learned some basic courses in sta matics course. nts also have some knowledge on statistic	atistics and statistical al software, such as R.	
Module objectives/intended learning outcomes:	After of CO 1. (techni CO 2. I facilita CO 3. / emplo schola	completing this course the students have a Gain advanced expertise in utilizing semip ques for flexible modeling of complex dat Develop skills to interpret semiparametric ating clear communication of findings and Attain autonomy in designing and executi ying advanced semiparametric regression rly advancements in diverse fields.	ability to: arametric regression a relationships. regression results accurately, insights. ng research projects methods, contributing to	
Content:	It will I on the studer	be derived from the research topic of the theory, models, and method of specific d nt research.	students. It will be focused lata analysis used in the	
Examination forms	Oral p	resentation, essay, paper		
Study and examination requirements and forms of	The fir	hal mark will be weighted as follows:		
examination:	No	Assessment methods	weight	
		(components, activities)	(percentage)	
	1	Final Examination (portfolio/essay/oral presentation)	35%	
	2	Mid-Term Examination (portfolio/essay/presentation)	35%	
	3	Class Activities: Presentation	30%	
	To pas	is the course, the minimum grade is B.		
Media employed:	Board,	, LCD Projector, Laptop/Computer		

Reading List:	1. Ruppert, D., Wand, M. P., & Carroll, R. J. (2003). Semiparametric
	regression. Cambridge University Press.
	2. Fan, J., & Yao, Q. (2003). Nonlinear time series: Nonparametric and
	parametric methods. Springer.
	3. Hardle, W., & Tsybakov, A. (2012). Introduction to nonparametric
	estimation. Springer Science & Business Media.
	4. Loader, C. (1999). Local regression and likelihood. Springer.

	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	V	V	V		V	
CO 2	V	V	V		V	
CO 3	V	v	V		v	V

Last Modified Date : October 9, 2023



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MODULE HANDBOOK Doctoral in Mathematics

(Topics in Advanced Statistical Data Analysis B)Code, if applicable:MMM 7420Subtitle, if applicableLongitudinal Data AnalysisSemester(s) in which the module is taught:1st or 2st senesterPerson responsible for the module:Chair of Statistics Research GroupLanguage:Bahasa IndonesiaRelation to curriculum:Doctoral Degree in Mathematics, Elective CourseTeaching methodsLecture, classroom discussion, project-based learning.Workload (incl. contact hours, self-study hours)Total workload is 232 hours per semester, which consists of 50 minutes lectures per week, 120 minutes of structured activities per week, 120 minutes of individual study per week, in total is 16 weeks per semester, including mid exam and final exam.Credit points in Credit Units3Required and recommended prerequisites for joining the moduleStudents have learned some basic courses in statistics and statistical mathematics course. Students also have some knowledge on statistical software, such as R.Module objectives/intended learning outcomes:After completing this course the students have ability to: CO 1. master in longitudinal data analysis techniques, enabling comprehensive exploration of temporal trends and relationships within data. CO 2. develop the ability to interpret longitudinal analysis results accurately, facilitating clear communication of findings and longingths. CO 3. Attain autonomy in designing and executing longitudinal data analysis research projects, fostering scholarly contributions and advancements in diverse fieldsContent:It will be derived from the research topic of the students. It will be focused on the theory, models, and m	Module name:	Topik dalam Analisis Data Statistik Lanjut B				
Code, if applicable:MMM 7420Subtite, if applicable:Longitudinal Data AnalysisSemester(s) in which the module is taught:1% or 2nd semesterPerson responsible for the module:Chair of Statistics Research GroupLanguage:Bahasa IndonesiaRelation to curriculum:Doctoral Degree in Mathematics, Elective CourseTeaching methodsLecture, classroom discussion, project-based learning.Workload (incl. contact hours, self-study hours)Total workload is 232 hours per semester, which consists of 50 minutes lectures per week, 120 minutes of structured activities per week, 120 minutes of individual study per week, in total is 16 weeks per semester, including mid exam and final exam.Credit points in Credit Units3Required and recommended prerequisites for joining the moduleStudents have learned some basic courses in statistical software, such as R.Module objectives/intended learning outcomes:After completing this course the students have ability to: CO 1. master in longitudinal data analysis techniques, enabling comprehensive exploration of temporal trends and relationships within data. CO 2. develop the ability to interpret longitudinal analysis results accurately, facilitating clear communication of findings and insights. CO 3. Attain autonomy in designing and executing longitudinal data analysis research projects, fostering scholarly contributions and advancements in diverse fieldsContent:It will be derived from the research topic of the students. It will be focused on the theory, models, and method of specific data analysis used in the student research.Examination formsOral presentation, essay, paper <td></td> <td colspan="4">(Topics in Advanced Statistical Data Analysis B)</td>		(Topics in Advanced Statistical Data Analysis B)				
Subtitle, if applicable Longitudinal Data Analysis Semester(s) in which the module is taught: 1st or 2 nd semester Person responsible for the module: Chair of Statistics Research Group Relation to curriculum: Doctoral Degree in Mathematics, Elective Course Teaching methods Lecture, classroom discussion, project-based learning. Workload (incl. contact hours, self-study hours) Total workload is 232 hours per semester, which consists of 50 minutes lectures per week, 120 minutes of structured activities per week, 120 minutes of individual study per week, in total is 16 weeks per semester, including mid exam and final exam. Credit points in Credit Units 3 Required and recommended prerequisites for joining the module Students have learned some basic courses in statistics and statistical mathematics course. Module objectives/intended learning outcomes: After completing this course the students have ability to: CO 1. master in longitudinal data analysis techniques, enabling comprehensive exploration of temporal trends and relationships within data. CO 2. develop the ability to interpret longitudinal analysis results accurately, facilitating clear communication of findings and insights. Content: It will be derived from the research topic of the students. It will be focused on the theory, models, and method of specific data analysis used in the student research. Examination forms Oral presentation, essay, paper	Code, if applicable:	MMM 7420				
Semester(s) in which the module is taught: 1st or 2 nd semester Person responsible for the module: Chair of Statistics Research Group Language: Bahasa Indonesia Relation to curriculum: Doctoral Degree in Mathematics, Elective Course Teaching methods Lecture, classroom discussion, project-based learning. Workload (incl. contact hours, self-study hours) Total workload is 232 hours per semester, which consists of 50 minutes lectures per week, 120 minutes of structured activities per week, 120 minutes of individual study per week, in total is 16 weeks per semester, including mid exam and final exam. Credit points in Credit Units 3 Required and recommended prerequisites for joining the module Students have learned some basic courses in statistics and statistical mathematics course. Module objectives/intended learning outcomes: After completing this course the students have ability to: CO 1. master in longitudinal data analysis techniques, enabling comprehensive exploration of temporal trends and relationships within data. CO 2. develop the ability to interpret longitudinal analysis research projects, fostering scholarly contributions and advancements in diverse fields Content: It will be derived from the research topic of the students. It will be focused on the theory, models, and method of specific data analysis used in the student research. Examination forms Oral presentation, essay, paper	Subtitle, if applicable	Longitudinal Data Analysis				
module is taught: Chair of Statistics Research Group Person responsible for the module: Chair of Statistics Research Group Language: Bahasa Indonesia Relation to curriculum: Doctoral Degree in Mathematics, Elective Course Teaching methods Lecture, classroom discussion, project-based learning. Workload (incl. contact hours, self-study hours) Total workload is 232 hours per semester, which consists of 50 minutes lectures per week, 120 minutes of structured activities per week, 120 minutes of individual study per week, in total is 16 weeks per semester, including mid exam and final exam. Credit points in Credit Units 3 Required and recommended prerequisites for joining the module Students have learned some basic courses in statistics and statistical mathematics course. Module objectives/intended learning outcomes: After completing this course the students have ability to: C0 1. master in longitudinal data analysis techniques, enabling comprehensive exploration of findings and insights. C0 2. develop the ability to interpret longitudinal analysis results accurately, facilitating clear communication of findings and and insights. C0 3. Attain autonomy in designing and executing longitudinal data analysis research projects, fostering scholarly contributions and advancements in diverse fields Content: It will be derived from the research topic of the students. It will be focused on the theory, models, and method of specific data analysis used in the student re	Semester(s) in which the	1 st or 2 nd semester				
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learning outcomes:CO 1. master in longitudinal data analysis techniques, enabling comprehensive exploration of temporal trends and relationships within data. CO 2. develop the ability to interpret longitudinal analysis results accurately, facilitating clear communication of findings and insights. CO 3. Attain autonomy in designing and executing longitudinal data analysis research projects, fostering scholarly contributions and advancements in diverse fieldsContent:It will be derived from the research topic of the students. It will be focused on the theory, models, and method of specific data analysis used in the student research.Examination formsOral presentation, essay, paperStudy and examination requirements and forms ofThe final mark will be weighted as follows:	Module objectives/intended	After completing this course the students have ability to:				
comprehensive exploration of temporal trends and relationships within data.CO 2. develop the ability to interpret longitudinal analysis results accurately, facilitating clear communication of findings and insights.CO 3. Attain autonomy in designing and executing longitudinal data analysis research projects, fostering scholarly contributions and advancements in diverse fieldsContent:It will be derived from the research topic of the students. It will be focused on the theory, models, and method of specific data analysis used in the student research.Examination formsOral presentation, essay, paperStudy and examination requirements and forms ofThe final mark will be weighted as follows:	learning outcomes:	CO 1. master in longitudinal data analysis techniques, enabling				
CO 2. develop the ability to interpret longitudinal analysis results accurately, facilitating clear communication of findings and insights. CO 3. Attain autonomy in designing and executing longitudinal data analysis research projects, fostering scholarly contributions and advancements in diverse fieldsContent:It will be derived from the research topic of the students. It will be focused on the theory, models, and method of specific data analysis used in the student research.Examination formsOral presentation, essay, paperStudy and examination requirements and forms ofThe final mark will be weighted as follows:		comprehensive exploration of temporal trends and relationships within data.				
facilitating clear communication of findings and insights.CO 3. Attain autonomy in designing and executing longitudinal data analysis research projects, fostering scholarly contributions and advancements in diverse fieldsContent:It will be derived from the research topic of the students. It will be focused on the theory, models, and method of specific data analysis used in the student research.Examination formsOral presentation, essay, paperStudy and examination requirements and forms ofThe final mark will be weighted as follows:		CO 2. develop the ability to interpret longitudinal analysis results accurately,				
CO 3. Attain autonomy in designing and executing longitudinal data analysis research projects, fostering scholarly contributions and advancements in diverse fieldsContent:It will be derived from the research topic of the students. It will be focused on the theory, models, and method of specific data analysis used in the student research.Examination formsOral presentation, essay, paperStudy and examination requirements and forms ofThe final mark will be weighted as follows:		facilitating clear communication of findings and insights.				
research projects, fostering scholarly contributions and advancements in diverse fields Content: It will be derived from the research topic of the students. It will be focused on the theory, models, and method of specific data analysis used in the student research. Examination forms Oral presentation, essay, paper Study and examination requirements and forms of The final mark will be weighted as follows:		CO 3. Attain autonomy in designing and executing longitudinal data analysis				
diverse fields Content: It will be derived from the research topic of the students. It will be focused on the theory, models, and method of specific data analysis used in the student research. Examination forms Oral presentation, essay, paper Study and examination requirements and forms of The final mark will be weighted as follows:		research projects, fostering scholarly contributions and advancements in				
Content: It will be derived from the research topic of the students. It will be focused on the theory, models, and method of specific data analysis used in the student research. Examination forms Oral presentation, essay, paper Study and examination requirements and forms of The final mark will be weighted as follows:		diverse fields				
Image: Study and examination forms of the final mark will be weighted as follows: The final mark will be weighted as follows:	Content:	It will be derived from the research topic of the students. It will be focused				
Examination forms Oral presentation, essay, paper Study and examination The final mark will be weighted as follows:		on the theory, models, and method of specific data analysis used in the				
Examination forms Oral presentation, essay, paper Study and examination The final mark will be weighted as follows:	Evention forms	Student research.				
requirements and forms of	Examination forms	Oral presentation, essay, paper				
	requirements and forms of	The final mark will be weighted as follows:				
examination: Assessment methods Weight	examination:	Assessment methods Weight				
(components, activities) (percentage)		(components, activities) (percentage)				
1 Final Examination (portfolio/essay/oral 35%		1 Final Examination (portfolio/essay/oral 35%				
presentation)		presentation)				
2 Mid-Term Examination 35%		2 Mid-Term Examination 35%				
(portfolio/essay/presentation)		(portfolio/essay/presentation)				
3 Class Activities: Presentation 30%		3 Class Activities: Presentation 30%				
To pass the course, the minimum grade is B.		To pass the course, the minimum grade is B.				
Media employed: Board, LCD Projector, Laptop/Computer	Madia amplayadı	Board ICD Projector Lanton/Computer				

Reading List:	 Fitzmaurice, G. M., Laird, N. M., & Ware, J. H. (2011). Applied longitudinal analysis (2nd ed.). Wiley. Singer, J. D., & Willett, J. B. (2003). Applied longitudinal data analysis: Modeling change and event occurrence. Oxford University Press. Raudenbush, S. W., & Bryk, A. S. (2002). Hierarchical linear models: Applications and data analysis methods (2nd ed.). Sage Publications. Verbeke, G., & Molenberghs, G. (2009). Linear mixed models for longitudinal data (2nd ed.). Springer.
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	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	V	V	V		V	
CO 2	V	V	V		V	
CO 3	V	V	V		V	V

Last Modified Date : October 9, 2023



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Doctor in Mathematics

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Website	: http://s3math.fmipa.ugm.ac.id/

Module name:	Topics in Advanced Data Analysis B				
Code, if applicable:	MMM 7420				
Subtitle, if applicable	Panel Data analysis				
Semester(s) in which the module is taught:	1 st or 2 nd semester	1 st or 2 nd semester			
Person responsible for the module:	Chair of Statistics Research Group				
Language:	Bahasa Indonesia				
Relation to curriculum:	Elective Course				
Teaching methods	Lecture, classroom discussion, project-based l	earning.			
Workload (incl. contact hours, self-study hours)	The total workload is 232 hours per semester, whic per week, 120 minutes of structured activities per w study per week, in total is 16 weeks per semester, in	h consists of 50 minutes lectures veek, and 120 minutes of individual ncluding mid and final exams.			
Credit points in Credit Units	3				
Required and recommended prerequisites for joining the	Students have learned some basic course in st mathematics course	atistics and statistical			
module	Students also have some knowledge on statstical software, such as R and Eviews				
Module objectives/intended learning outcomes:	After completing this course, the students have ability to: CO 1. Be able to analyze the theoretical aspect of modeling panel data using the linear panel models related to the doctoral research being studied CO2. Use econometric software for panel data analysis and interpret the output from econometric software to do an appropriate statistical analysis related to the doctoral research being studied CO3. Be able to analyze some extended panel model related to the doctoral research being studied				
Content:	It will be derived from the research topic of the on the theory, models, and method of specific student research.	e students. It will be focused data analysis used in the			
Examination forms	Oral presentation, essay, paper				
Study and examination requirements and forms of examination:	 The final mark will be weighted as follows: Assessment methods (components, activities) Final Examination (portfolio/essay/oral presentation) Mid-Term Examination (portfolio/essay/presentation) Class Activities: Presentation 	Weight (percentage) 35% 35% 30%			
	To pass the course, the minimum grade is B.				

Media employed:	Board, LCD Projector, Laptop/Computer
Reading List:	 Badi H. Baltagi, Econometric analysis of Panel Data 5th eds, 2013, Wiley Hsiao, C. H., Analysis of Panel Data, 3nd ed., 2014, Cambridge Recent publication on panel data analysis

	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	v	v	v		v	
CO 2	v	v	v		v	
CO 3	V	V	V		V	V

Last Modified Date : February 10, 2024



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Doctor in Mathematics

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MODULE HANDBOOK Doctoral in Mathematics

Module name:	Topik dalam Analisis Data Statistik Lanjut B				
	(Topics in Advanced Statistical Data Analysis B)				
Code, if applicable:	MMM 7420				
Subtitle, if applicable	Data Simulation and Bootstrap				
Semester(s) in which the	1 st or 2 nd semester				
module is taught:					
Person responsible for the module:	Chair of Statistics Research Group				
Language.	Bahasa Indonesia				
Relation to curriculum:	Doctoral Degree in Mathematics, Elective Course				
Teaching methods	Lecture, classroom discussion, project-based learning				
Workload (incl. contact hours	Total workload is 232 hours per semester, which consists of 50 minutes				
self-study hours)	lectures per week, 120 minutes of structured activities per week, 120 minutes				
	of individual study per week, in total is 16 weeks per semester, including mid				
	exam and final exam.				
Credit points in Credit Units	3				
Required and recommended	Students have learned some basic courses in statistics and statistical				
prerequisites for joining the	mathematics course.				
module	Students also have some knowledge on statistical software, such as R.				
Module objectives/intended	After completing this course the students have ability to:				
learning outcomes:	CO 1. Attain proficiency in generating simulated datasets to replicate complex				
	real-world scenarios for statistical analysis.				
	CO 2. Develop skills in utilizing bootstrap resampling methods to assess				
	uncertainty and validate statistical inferences.				
	CO 3. Gain autonomy in designing and conducting research projects				
	employing data simulation and bootstrap techniques, contributing to				
	scholarly advancements in diverse fields.				
Content:	It will be derived from the research topic of the students. It will be focused				
	on the theory, models, and method of specific data analysis used in the				
	Student research.				
Examination forms	Oral presentation, essay, paper				
Study and examination	The final mark will be weighted as follows:				
examination:	Assessment methods Weight				
	(components, activities) (percentage)				
	1 Final Examination (portfolio/essay/oral 35%				
	presentation)				
	2 Mid-Term Examination 35%				
	(portfolio/essay/presentation)				
	3 Class Activities: Presentation 30%				
	To pass the course, the minimum grade is B.				
Media employed:	Board, LCD Projector, Laptop/Computer				

 CRC press. Gentle, J. E. (2003). Random number generation and Monte Carlo methods (2nd ed.). Springer. Kong, Y., & Nan, B. (2012). Introduction to Quantitative Research Methods: An Investigative Approach. SAGE Publications. 	Reading List:	 Davison, A. C., & Hinkley, D. V. (1997). Bootstrap methods and their application. Cambridge University Press. Efron, B., & Tibshirani, R. J. (1994). An introduction to the bootstrap. CRC press. Gentle, J. E. (2003). Random number generation and Monte Carlo methods (2nd ed.). Springer. Kong, Y., & Nan, B. (2012). Introduction to Quantitative Research Methods: An Investigative Approach. SAGE Publications.
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	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	V	V	V		V	
CO 2	V	V	V		V	
CO 3	V	V	V		V	V

Last Modified Date : October 9, 2023



Faculty of Mathematics and Natural Sciences Mathematics Department Sekip Utara Bulaksumur Yogyakarta 55281 Telp: +62 274 552243 Fax: +62 274 555131 Email: <u>math@ugm.ac.id</u> Website: matematika.fmipa.ugm.ac.id

Doctor in Mathematics

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 Website
 : http://s3math.fmipa.ugm.ac.id/

Module name:	Topics in Advanced Statistical Data Analysis B				
Code, if applicable:	MMM-7420				
Subtitle, if applicable	Wavelet and its applications				
Semester(s) in which the	1 st or 2 nd semester				
module is taught:					
Person responsible for the	Chair of the Lab. of Statistics				
module:					
Language:	Bahasa Indonesia				
Relation to curriculum:	Elective course in the 1 st or 2 nd semester of doctor's degree				
Credit points:	3				
Type of teaching,	Lecture, classroom discussion, flipped classroom, project.				
contact hours:					
Workload (incl. contact hours, self-study hours)	Total workload is 232 hours per semester, which consists of 50 minutes lectures per week, 120 minutes of structured activities per week, 120 minutes of individual study per week in total is 16 weeks per semester, including mid exam and final exam				
Credit points in Credit Units	3				
Required and recommended prerequisites for joining the	Students must have a basic understanding of statistics and linear algebra before enrolling in this course.				
Module Module chiestings (intended					
Module objectives/intended	After completing this course, students will have the knowledge and adulties to:				
learning outcomes:	CO 1: Able to applyze concepts of wavelets as well as their applications				
	CO-1. Able to analyze concepts of wavelets as well as then applications.				
	 The fundamental concepts of wavelets The fundamental concepts and applications of Discrete Wavelet 				
	The fundamental concepts and applications of Discrete Wavelet Transforms				
	• The fundamental concepts and applications of Multi Resolution Analysis				
	CO-2: Able to analyse associated with Wavelet in Statistics.				
	• Wavelet analysis of time series				
	Wavelet thresholding				
	• Statistical data analysis using DWT (in Python)				
	CO-3: Create the application of wavelet in relation to their doctoral research.				
	Wavelet for image denoising				
	• Multi-level wavelet for image denoising				
Content:	It will be derived from the student research topic. It will concentrate on the theory				
	and applications of specific data used in student research.				
Study and examination	The final mark will be weighted as follows:				
requirements and forms of	No. Assessment methods (components, activities) Weight (percentage)				
examination:	1. Formulation the originality of research 25%				
	problem (portfolio/essay)				
	2. Formulation the theoritical framework 25%				
	(portfolio/essay)				
	3. Formulation the conjecture and metodhology 20%				
	(portfolio/essay)				
	4. Class Activities (Presentation) 50%				
	To pass the course, the minimum grade is B.				

Media employed:	White/Black Board, LCD Projector, Laptop/Computer			
Reading List:	 The related references to the dissertation will be chosen based on the topic and substance. General references: Arfaoui, S., Ben Mabrouk, A., & Cattani, C. (2021). Wavelet Analysis: Basic Concepts and Applications (1st ed.). Chapman and Hall/CRC. https://doi.org/10.1201/9781003096924 			

	Mapping of The COs and PLOs							
ſ		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	V	V	v		v	v	
	CO 2	V	V	V		V	V	
	CO 3	v	V	v		v	v	