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Doctor in Mathematics

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MODULE HANDBOOK

Module name:	Topik dalam Analisis Data Statistik Lanjut A *(Topics in Advanced Data Analysis A)*
Code, if applicable:	MMM 7419
Subtitle, if applicable	
Semester(s) in which the module is taught:	1st or 2nd 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)	The total workload is 232 hours per semester, which consists of 50 minutes lectures 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 students have a good understanding of the basics of Data Analysis. 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: CO1. Proficient in statistical data analysis CO2. Proficient in time series data analysis. CO3. Proficient in panel and spatial data analysis.
Content:	Stationarity, ARMA Models, Spectral Analysis, Modeling and forecasting with ARMA processes, Nonstationary and seasonal time series models, Case studies (real data applications), and Geographically weighted regression methods. The specific topics and syllabus for this course will be determined in relation to the student's research topic.
Examination forms	Oral presentation, essay, paper
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 (portfolio/essay/oral presentation) — 35% 2 — Mid-Term Examination (portfolio/essay/presentation) — 35% 3 — Class Activities: Presentation — 30% To pass the course, the minimum grade is B.

Media employed:	Board, LCD Projector, Laptop/Computer
Reading List:	1. Brockwell, P.J., Davis, R. A., Time Series: Theory and Method, Springer, 2002. 2. Daniel, P., dkk, A course in Time Series Analysis, John Wiley and Sons, 2001 3. Box, J.E.P, dkk, Time Series Analysis: Forecasting and Control, Ed 4., John Wiley and Sons, 2016 4. Fotheringham, A.S, Brundson, C dan Charlton, M. (2002), Geographically Weighted Regression : The Analysis of Spatially Varying Relationships, John Wiley & Sons Ltd, England.

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	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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MODULE HANDBOOK

Module name:	Topik dalam Analisis Data Statistik Lanjut A *(Topics in Advanced Data Analysis A)*
Code, if applicable:	MMM 7419
Subtitle, if applicable	Advanced time series analysis
Semester(s) in which the module is taught:	1st or 2nd 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)	The total workload is 232 hours per semester, which consists of 50 minutes lectures 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	Students have learned univariate time series analysis 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: CO1. analyze some time series analysis models related to the doctoral research being studied CO2. perform computation of some time series models related to the doctoral research being studied CO3. interpret the output from the computation of some time series models 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: No — Assessment methods (components, activities) — Weight (percentage) 1 — Final Examination (portfolio/essay/oral presentation) — 35% 2 — Mid-Term Examination (portfolio/essay/presentation) — 35% 3 — Class Activities: Presentation — 30% To pass the course, the minimum grade is B.

Media employed:	Board, LCD Projector, Laptop/Computer
Reading List:	1. Shumway, R. H. and Stoffer, D.S., 2017, Time Series Analysis and Its Applications: With R Examples (Springer Texts in Statistics) 4th ed. , Springer Verlag 2. Brockwell, R. And Davis, R.A. 2016, Introduction to Time Series and Forecasting (Springer Texts in Statistics) 3rd ed. 2016 Edition 3. Recent publication on time series analysis

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

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MODULE HANDBOOK

Module Name	Topics in Advanced Data Analysis A
Code, if applicable	**MMM 7419**
Subtitle, if applicable	Geographically Weighted Regression (GWR)
Semester(s) in which the module is taught	1st or 2nd semester
Person responsible for the module	Chair of Statistics Laboratory
Language	Bahasa Indonesia
Relation to curriculum	Elective course
Teaching methods	Lecture, classroom discussion, flipped classroom, project.
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	3
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	On successful completion of this course, students should be able to: ● CO 1 master Local Statistics and Local Models for Spatial Data ● CO 2 perform Statistical Inference and Geographically Weighted Regression ● CO 3 perform Geographically Weighted Regression and Spatial Correlation ● CO 4 develop the Extention of Geographically Weighting

Content	Local Statistics and Local Models for Spatial Data, Statistical Inference and Geographically Weighted Regression, Geographically Weighted Regression and Spatial Correlation, the Extention of Geographically Weighting
Examination forms	*oral presentation and essay.*
Study and examination requirements	The final mark will be weighted as follows: No — Assessment methods (components, activities) — Weight (percentage) 1 — Final Examination (portfolio/essay/oral presentation) — 35% 2 — Mid-Term Examination (portfolio/essay/presentation) — 35% 3 — Class Activities: Presentation — 30% To pass the course, the minimum grade is B.
Media employed	online platforms, Learning management systems, LCD projectors, and whiteboards.
Reading list	Fotheringham, A. S., Brunsdon C., Charlton M., 2002. Geographically Weighted Regression: the analysis of spatially varying relationships, John Wiley & Sons, LTD, England. .

CO-PLO Mapping

	PLO 1	PLO 2	PLO 3	PLO 4	PLO 5	PLO 6
CO 1	v					
CO 2	v	v				
CO 3	v		v			
CO 4	v			v		v

Compilation Date : 2/1/2023

Modified Date : 1/2/2024

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MODULE HANDBOOK
Doctoral in Mathematics

Module name:	Topik dalam Analisis Data Statistik Lanjut A *(Topics in Advanced Statistical Data Analysis A)*
Code, if applicable:	MMM 7419
Subtitle, if applicable	Nonparametric Regression
Semester(s) in which the module is taught:	1st or 2nd 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. 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. expertise in nonparametric regression techniques, allowing for flexible modeling of complex data relationships without reliance on predefined functional forms. CO 2. Develop skills to interpret and effectively communicate the results of nonparametric regression analyses, facilitating clear understanding and dissemination of findings. CO 3. Acquire the autonomy to apply nonparametric regression methods in research settings, enabling the generation of insightful analyses and contributions to scholarly literature.
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: No — Assessment methods (components, activities) — Weight (percentage) 1 — Final Examination (portfolio/essay/oral presentation) — 35% 2 — Mid-Term Examination (portfolio/essay/presentation) — 35% 3 — Class Activities: Presentation — 30% To pass the course, the minimum grade is B.

Media employed:	Board, LCD Projector, Laptop/Computer
Reading List:	1. Conover, W. J. (1999). Practical Nonparametric Statistics (3rd ed.). John Wiley & Sons. 2. Hollander, M., & Wolfe, D. A. (1999). Nonparametric Statistical Methods (2nd ed.). John Wiley & Sons. 3. Gibbons, J. D., & Chakraborti, S. (2011). Nonparametric Statistical Inference (5th ed.). CRC Press. 4. Wasserman, L. (2006). All of Nonparametric Statistics. Springer Science & Business Media.

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	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 A (*Topics in Advanced Statistical Data Analysis A*)
Code, if applicable:	MMM 7419
Subtitle, if applicable	Survival Data Analysis
Semester(s) in which the module is taught:	1st or 2nd 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. 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 the fundamental principles and techniques of survival analysis, empowering the understanding and interpretation of time-to-event data in research contexts. CO 2. Develop adeptness in constructing and interpreting sophisticated survival models, facilitating nuanced insights into complex relationships within survival data. CO 3. Attain the autonomy to design and execute survival analysis research projects, enabling the production of high-quality scholarly work and contributions to academic discourse.
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: No — Assessment methods (components, activities) — Weight (percentage) 1 — Final Examination (portfolio/essay/oral presentation) — 35% 2 — Mid-Term Examination (portfolio/essay/presentation) — 35% 3 — Class Activities: Presentation — 30% To pass the course, the minimum grade is B.

Media employed:	Board, LCD Projector, Laptop/Computer
Reading List:	1. Hosmer Jr, D. W., Lemeshow, S., & May, S. (2008). Applied survival analysis: Regression modeling of time-to-event data. John Wiley & Sons. 2. Kleinbaum, D. G., & Klein, M. (2012). Survival analysis: A self-learning text. Springer Science & Business Media. 3. Therneau, T. M., & Grambsch, P. M. (2000). Modeling survival data: Extending the Cox model. Springer.

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	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 dalam Komputasi Statistika Lanjut A *(Topics in statistics computation A)*
Code, if applicable:	MMM 7419
Subtitle, if applicable	Spline Regression
Semester(s) in which the module is taught:	1st or 2nd 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. 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. Attain expertise in spline regression methodologies, enabling precise modeling of intricate nonlinear relationships within data. CO 2. Develop the ability to interpret spline regression models adeptly, facilitating clear understanding and communication of findings. CO 3. Gain the skills to conduct independent research utilizing spline regression techniques, contributing valuable insights to scholarly discourse.
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: No — Assessment methods (components, activities) — Weight (percentage) 1 — Final Examination (portfolio/essay/oral presentation) — 35% 2 — Mid-Term Examination (portfolio/essay/presentation) — 35% 3 — Class Activities: Presentation — 30% To pass the course, the minimum grade is B.
Media employed:	Board, LCD Projector, Laptop/Computer

Reading List:	1. Hastie, T., Tibshirani, R., & Friedman, J. (2009). The elements of statistical learning: data mining, inference, and prediction (2nd ed.). Springer. 2. Eilers, P. H., & Marx, B. D. (1996). Flexible smoothing with B-splines and penalties. Statistical Science, 11(2), 89-121. 3. Wood, S. N. (2017). Generalized additive models: an introduction with R (2nd ed.). CRC press. 4. Wahba, G. (1990). Spline models for observational data (Vol. 59). SIAM.

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	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 A (*Topics in Advanced Statistical Data Analysis A*)
Code, if applicable:	MMM 7419
Subtitle, if applicable	Small Area Estimation
Semester(s) in which the module is taught:	1st or 2nd 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. 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. Develop proficiency in various small area estimation techniques, enabling accurate inference for areas with limited data. CO 2. Acquire the ability to apply sophisticated statistical models tailored for small area estimation, facilitating precise estimation in complex data environments. CO 3. Gain autonomy in designing and executing small area estimation research projects, fostering contributions to scholarly literature and practical applications 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 examination:	The final mark will be weighted as follows: No — Assessment methods (components, activities) — Weight (percentage) 1 — Final Examination (portfolio/essay/oral presentation) — 35% 2 — Mid-Term Examination (portfolio/essay/presentation) — 35% 3 — Class Activities: Presentation — 30% To pass the course, the minimum grade is B.
Media employed:	Board, LCD Projector, Laptop/Computer

Reading List:	1. Rao, J. N. K. (2003). Small area estimation (2nd ed.). Wiley. 2. Pfeffermann, D., & Rao, J. N. K. (2009). Handbook of statistics: Vol. 29A. Sample surveys: Design, methods and applications. Elsevier. 3. Molina, I., & Rao, J. N. K. (2010). Small area estimation. John Wiley & Sons. 4. Chambers, R. L., & Tzavidis, N. (2006). Bayesian methods in small area estimation: Theory and applications. John Wiley & Sons.

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

Last Modified Date : October 9, 2023