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Doctor in Mathematics

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MODULE HANDBOOK

Module name:	*Topics in Advanced Data Analysis B*
Code, if applicable:	MMM 7420
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:	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 student possesses a good understanding of the fundamentals of Data Analysis.
Module objectives/intended learning outcomes:	After completing this course, the students have ability to: CO 1. Mastery of the development of statistical data analysis. CO2. Mastery of the development of time series data analysis. CO3. Mastery of the development of panel and spatial data analysis.
Content:	1. Survival data (event history, duration, time-to-event data), Survival 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 nonparametric regression and the difference with parametric regression: Density estimation with histogram and kernel approaches, Nonparametric regression curve estimation with kernel and spline approaches, Bandwidth selection in nonparametric kernel regression, Knot selection in nonparametric spline regression, Nonparametric regression with other approaches (Fourier Series) along with bandwidth selection, Application of nonparametric regression to a dataset.
Examination forms	Oral presentation, essay, paper
Study and examination requirements and forms of	The final mark will be weighted as follows:

examination:	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. Aalen, O.O., Borgan, O., Gjessing, H.K., 2008, Survival and Event History Analysis: A Process Point of View. Springer, Berlin. 2. Andersen, P.K., Borgan, O., Gill, R.D., Keiding, N., 1993, Statistical Models based on Counting Processes. Springer, New York. 3. Klein, J. P dan Moeschberger, M. L., 2003, Survival Analysis: Techniques for Censored and Truncated Data, 2nd ed.. Springer. 4. Eubank, R.L. (1988). Spline Smoothing and Nonparametric Regression. Marcel Dekker Ins, New York. 5. Green, P.J. and Silverman, B.W. (1994). Nonparametric Regression and Generalized Linear Models. Chapman and Hall, London. 6. Hardle, W. (1990). Applied Nonparametric Regression. Cambridge University Press, New York. 7. Hardle, W. (1991). Smoothing Techniques with Implementation in S. Spinger Verlag, New York. 8. Takezawa, K. (2006). Introduction to Nonparametric Regression. John Wiley and Sons, Inc., New Jearsy. 9. Thompson, J.R. and Tapia, R.A. (1990). Nonparametric Function Estimation, Modelling and Simulations. SIAM, Philadelpia. 10. Wahba, G. (1990). Spline Models for Observational Data. SIAM, Pensylvania.

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:	*Topics in Advanced Data Analysis B*
Code, if applicable:	MMM 7420
Subtitle, if applicable	Statistical Data Mining
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 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: 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., 2016, The Elements of Statistical Learning (2nd Edition), Springer Verlag, New York 2. Recent publication on statistical data mining related to the research

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 B *(Topics in Advanced Statistical Data Analysis B)*
Code, if applicable:	MMM 7420
Subtitle, if applicable	Advanced Semiparametric 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. Gain advanced expertise in utilizing semiparametric regression techniques for flexible modeling of complex data relationships. CO 2. Develop skills to interpret semiparametric regression results accurately, facilitating clear communication of findings and insights. CO 3. Attain autonomy in designing and executing research projects employing advanced semiparametric regression methods, 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 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. 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.

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

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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	Longitudinal 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 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 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. Fitzmaurice, G. M., Laird, N. M., & Ware, J. H. (2011). Applied longitudinal analysis (2nd ed.). Wiley. 2. Singer, J. D., & Willett, J. B. (2003). Applied longitudinal data analysis: Modeling change and event occurrence. Oxford University Press. 3. Raudenbush, S. W., & Bryk, A. S. (2002). Hierarchical linear models: Applications and data analysis methods (2nd ed.). Sage Publications. 4. Verbeke, G., & Molenberghs, G. (2009). Linear mixed models for longitudinal data (2nd ed.). 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

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:	1st or 2nd 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 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 some basic course in statistics and statistical mathematics course 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 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. Badi H. Baltagi, Econometric analysis of Panel Data 5th eds, 2013, Wiley 2. Hsiao, C. H., Analysis of Panel Data, 3nd ed., 2014, Cambridge 3. Recent publication on panel data 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
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 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 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 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. Davison, A. C., & Hinkley, D. V. (1997). Bootstrap methods and their application. Cambridge University Press. 2. Efron, B., & Tibshirani, R. J. (1994). An introduction to the bootstrap. CRC press. 3. Gentle, J. E. (2003). Random number generation and Monte Carlo methods (2nd ed.). Springer. 4. Kong, Y., & Nan, B. (2012). Introduction to Quantitative Research Methods: An Investigative Approach. SAGE Publications.

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 Statistical Data Analysis B
Code, if applicable:	MMM-7420
Subtitle, if applicable	Wavelet and its applications
Semester(s) in which the module is taught:	1st or 2nd semester
Person responsible for the module:	Chair of the Lab. of Statistics
Language:	Bahasa Indonesia
Relation to curriculum:	Elective course in the 1st or 2nd semester of doctor's degree
Credit points:	3
Type of teaching, contact hours:	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 in Credit Units	*3*
Required and recommended prerequisites for joining the module	Students must have a basic understanding of statistics and linear algebra before enrolling in this course.
Module objectives/intended learning outcomes:	After completing this course, students will have the knowledge and abilities to: CO-1: Able to analyze concepts of wavelets as well as their applications. • The fundamental concepts of Wavelets • 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 requirements and forms of examination:	The final mark will be weighted as follows: No. Assessment methods (components, activities) Weight (percentage) 1. Formulation the originality of research problem (portfolio/essay) 25% 2. Formulation the theoritical framework (portfolio/essay) 25% 3. Formulation the conjecture and metodhology (portfolio/essay) 20% 4. Class Activities (Presentation) 30% 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: 1. 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

	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