UNIVERSITAS GADJAH MADA
Faculty of Mathematics and Natural Sciences
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Doctoral Program in Mathematics

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MODULE HANDBOOK
Doctoral in Mathematics

Module name:	Advanced time series analysis
Module level, if applicable:	Doctoral
Code, if applicable:	MMM 7402
Semester(s) in which the module is taught:	2nd (second) year
Person responsible for the module:	Chair of Analysis Statistics Research Group
Lecturer(s):	Prof. Dr.rer.nat. Dedi Rosadi, S.Si., M.Sc.
Language:	Bahasa Indonesia
Relation to curriculum:	Doctoral Degree in Mathematics, Elective Course
Credit points:	3 Semester Credit Unit
Type of teaching, contact hours:	3x50 minutes lectures, 3x60 minutes structured activities.
Workload:	3 hours lectures, 3 hours structured activities, 3 hours individual study, 16 weeks per semester (including mid-term and final examinations), 144 hours per semester.
Recommended prerequisites:	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 : CO 1. understand some multivariate time series analysis models used in practice CO2.. use econometric software for time series analysis and interpret the output from econometric software to do an appropriate statistical analysis CO3. Understand some advanced univariate models
Content:	Overview some basic univarite time series model: Decomposition, Exponential smoothing, Moving average smoothing, ARMA, ARIMA and SARIMA, ARCH/GARCH, some multivarite model:VAR, VECM, Cointegration, multivarite GARCH, some advanced method: Singular Spectrum Analysis, Autoregressive Duration Model, time series analysis for cryptocurrency data, etc.
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 — 35% 2 — Mid-Term Examination — 30% 3 — Projects/Presentation — 25% 4 — Peer Assessment/Quiz — 10% 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.
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

Programme Learning Outcomes (PLO) Doctoral Programme in Mathematics

PLO-1	:	**Attitude:** Devote to God Almighty, uphold the humanity values, internalize academic values and ethics, responsible in working in the area of expertise independently.
PLO-2	:	**Knowledge:** Mastering philosophy of mathematics and one of the fields in mathematics (algebra, analysis, applied mathematics, statistics, computational mathematics, computational statistics).
PLO-3	:	**Knowledge:** 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.
PLO-4	:	**Skill:** Creating new concepts and / or new methods (original) in the field of mathematics that are recognized nationally and internationally.
PLO-5	:	**Skill:** 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.
PLO-6	:	***Life Long Learning:*** Having lifelong learning skills and adaptive to the development of science and technology, especially in fields related to Mathematics and its applications.