



UNIVERSITAS GADJAH MADA

Faculty of Mathematics and Natural Sciences

Mathematics Department

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Postgraduate Programme in Mathematics

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MODULE HANDBOOK

Module name	Data Simulation and Bootstrapping
Module-level, if applicable	S3/Doctoral
Code, if applicable	MMM 5404
Semester(s) in which the module is taught	
Person responsible for the module	Prof Dr Sri Haryatmi Kartiko, M.Sc.
Lecture(s)	Prof Dr Sri Haryatmi Kartiko, M.Sc.
Language	Indonesia
Classification within the Curriculum	Compulsory course/ Elective Studies
Teaching format /class hours per week during the semester:	3 hours lecture
Workload	3 hours lectures + 6 hours individual study, 14 weeks per semester, and total 126 hours a semester
Credit points	3 SKS
Requirements	-
Module objectives/intended learning outcomes	By the end of this course : CO 1. Students can calculate the bootstrap estimate of the standard error CO 2. Students can construct bootstrap-<i>t</i> confidence interval, and some modifications CO 3. Students can do a bootstrap hypothesis test
Content	The bootstrap estimate of the standard error, bootstrap for more complicated data structure, estimation of bias, the bootstrap- <i>t</i> confidence interval, confidence intervals based on bootstrap percentiles, better bootstrap confidence intervals, hypothesis testing with the bootstrap.
Study and examination requirements and forms of examination	The weight of assignments will be as follows: i. Quiz, homework 15% ii. Mid-semester exam 40% iii. Final exam 45% Grade scale: A: $80 \leq \text{score}$ A/B: $70 \leq \text{score} < 80$ B: $60 \leq \text{score} < 70$ B/C: $50 \leq \text{score} < 60$ C: $40 \leq \text{score} < 50$ D: $20 \leq \text{score} < 40$ E: $\text{score} < 20$
Media employed	Slides and LCD projectors, whiteboards
Reading List	<ol style="list-style-type: none"> Efron, B. & Tibshirani, R.J., An Introduction to The Bootstrap, Chapman&Hall, 1993. Hall, P., The Bootstrap and Edgeworth Expansion, Springer, 1995. Chernick, M.R. Bootstrap Methods: A Guide for Practitioners and Researchers. John Wiley & Sons, Inc. 2008. Godfrey, L., Bootstrap Tests for Regression Models, Palgrave Macmillan, 2009. Zieffler, A.S., Haring, J.R., & Long, J.D., Comparing Groups: Randomization and Bootstrap Methods Using R, John Wiley & Sons, Inc, 2011.

CO and PLO mapping

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

Learning Achievement Formulation (PLO) in the Mathematics Study Program S3

PLO-1	Attitude: Be faithful to God Almighty, uphold human values, internalize values, norms, and academic ethics, be responsible for work in the field of expertise independently.
PLO-2	Knowledge: Mastering the main concepts of mathematics (Analysis, Advanced Linear Algebra, and Mathematical Statistics) methodology, and their interrelations.
PLO-3	Knowledge: Mastering one or several theories for development a. analysis b. algebra c. applied mathematics d. statistics e. actuarial f. financial mathematics g. mathematical computing h. statistical computing
PLO-4	General Skills: Being able to identify scientific fields that are the objects of his research and position them into a research map that is developed creatively, innovatively, and tested through a multidisciplinary or interdisciplinary approach and communicates them to the academic community.
PLO-5	Special Skills: Mastering the knowledge of current issues, developments in the field of mathematics, especially those related to theory and its application, through a learning process that is of a national standard and of an international standard.
PLO-6	<i>Life Long Learning:</i> Understand and live the philosophy of life-long learning