



UNIVERSITAS GADJAH MADA

Faculty of Mathematics and Natural Sciences

Mathematics Department

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Master Program in Mathematics

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MODULE HANDBOOK

Module name:	Pemodelan Harga Opsi dan Finansial (Option Pricing and Financial Modeling)
Module level, if applicable:	Master Program
Code, if applicable:	MMM 5516
Semester(s) in which the module is taught:	1
Person responsible for the module:	Chair of Statistics Research Group Dr. Gunardi, M.Si
Lecturer(s):	Dr. Abdurakhman
Language:	Indonesian
Relation to curriculum:	Master Degree in Mathematics, Elective Course
Credit points:	3 Semester Credit Unit
Type of teaching, contact hours:	3x50 minutes lectures, 3x60 minutes structured activities.
Workload:	<ul style="list-style-type: none">• 3x50 minutes lectures,• 3x60 minutes structured activities,• 3x60 minutes individual study,• In 16 weeks per semester (including assignments and examinations)
Recommended prerequisites:	-
Module objectives/intended learning outcomes:	After completing this course, students are expected to be able to: CO1. Able to understand theory of interest CO2. Able to understand and analyze option theory. CO3. Able to understand and analyze the B-S model option pricing theory and Binomial models CO4. Applying points a and b in options trading.
Content:	This course is a course that discusses the application of mathematics in finance. Topics include interest material, interest rates, simple interest, compound interest, continuous interest, accumulated value, present value, discount rate. This course also studies the series of payments or annuities, basic annuities, advanced annuities, perpetuities, amortization, sinking funds. In addition, this course also studies the determination of bond prices, yields, reinvestment of interest rates, net present value. Option valuation theory, various options, volatility and estimation. Market mechanization in options trading. Strategies in options trading. The option price valuation model uses simulation techniques. Black Scholes Merton (BSM) model, BSM formula. Gram Charlier's expansion B-S model, Application of the Black Scholes model to the options market. Performance analysis of the Black Scholes model. Data analysis using R and Matlab software.

Study and examination requirements and forms of examination:	The final mark will be weighted as follows:			
	No (components, activities) Weight (percentage)			
	1	Homework		20
	2	Paper assignment		50
	3	Discussion		30
	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.			
	Grade scale:			
	A	$80 \leq \text{score}$	C	$40 \leq \text{score} < 50$
	A/B	$70 \leq \text{score} < 80$	D	$20 \leq \text{score} < 40$
	B	$60 \leq \text{score} < 70$	E	$\text{score} < 20$
	B/C	$50 \leq \text{score} < 60$		
Media employed:	Slides, White Boards, Power point			
Reading List:	<ol style="list-style-type: none"> 1. Kellison, S. G., 1991. <i>The Theory of Interest</i>, John Wiley & Sons. New York. 2. Yuh-Dauh Lyuu, 2004. <i>Financial Engineering and Computation</i>. Cambridge University Press, United Kingdom. 3. John C Hull, Options, Futures, and Other Derivatives, 6th Edition, Prentice Hall, 2005. 4. Wilmott, P, Introduces Quantitative Finance, John Wiley & Sons Ltd, The Atrium, Southern Gate, Chichester, West Sussex PO19 8SQ, England 			

Mapping of The COs and PLOs

	PLO - 1 S2 Mat	PLO - 2 S2 Mat	PLO - 3 S2 Mat	PLO - 4 S2 Mat	PLO - 5 S2 Mat	PLO -6 S2 Mat
CO 1			x			
CO 2			x			
CO 3					x	
CO 4					x	

Programme Learning Outcomes (PLO) Master Programme in Mathematics

PLO-1	:	Attitudes and Values: Have the following attitudes and values: Fear of God Almighty, uphold human values, internalize academic values, norms and ethics, be responsible for work in the field of expertise independently.
PLO-2	:	General Knowledge (Core competences): Mastering the main concepts of mathematics (Analysis, Advanced Linear Algebra, Mathematical Statistics, Modeling and Computing) methodology, and its interrelation.
PLO-3	:	Specific Knowledge: Having mastery of comprehensive knowledge in one or several theories for development <ul style="list-style-type: none"> a. analysis field b. algebra and combinatorics c. fields of applied mathematics and computing d. statistics and data science
PLO-4	:	General Skills: Able to identify scientific fields that are the object 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 it to the academic community.
PLO-5	:	Special Skills:

		Mastering knowledge of current issues, developments in the field of mathematics, especially those related to theory and its applications, through a learning process that is of national and international standards.
PLO-6	:	Life Long Learning: Understand and be able to live the philosophy of lifelong learning and be adaptive to the development of science and technology, especially fields related to mathematical theory and its application and have an instinct in developing or applying mathematics and developing new challenges.