



**INSTITUT TEKNOLOGI SEPULUH NOPEMBER  
FACULTY OF SCIENCE AND DATA ANALYTICS  
DEPARTMENT OF STATISTICS  
STATISTICS UNDERGRADUATE PROGRAM**

Course

Course Name	:	<b>Analysis of Risk and Portfolio Optimization</b>
Course Code	:	SS234746
Credit	:	3 SKS
Semester	:	VII

**COURSE DESCRIPTION**

Analysis of Risk and Portfolio Optimization is a course that contains statistical methods for measuring risk according to risk theory and financial theory. The results of the risk analysis can be used as a basis for decision making to determine risk diversification and investment portfolio optimization. Students learn the concepts of financial risk management, financial statement analysis, and statistical methods for risk analysis and modeling, as well as portfolio optimization. Students also learn methods for predicting future risks based on historical data and fundamental analysis based on financial ratios. To achieve this goal, the learning strategies used are discussions, problem based learning (PBL), and exercises and assignments to analyze real data.

**PROGRAM LEARNING OUTCOME**

PLO-4	Able to apply science and mathematics to support the understanding of statistical methods
PLO-9	Able to apply statistical methods to analyze theoretical and real problems
PLO-10	Able to apply business, industrial, economic, social, environmental or health statistical methods to real problems.

**COURSE LEARNING OUTCOME**

CLO-1	Understand the concept of risk management in finance
CLO-2	Able to Analyze the Financial Statement (Report) of Corporate
CLO-3	Understand the Concept of Risk and Return
CLO-4	Able to analyze and optimize portfolio

**MAIN SUBJECT**

1. Review of Financial Mathematics,
2. Risk identification, measurement, and management
3. A description of the corporate's financial statements in general and in particular of activity, profitability, liquidity and solvency ratios
4. Market Risk
5. VaR calculation using the Kernel Density Estimator (KDE) approach
6. Calculations for dependent risk using Copulae approach
7. Modeling risk with exogenous variables using ARMA-X & GARCH-X, and using Conditional VaR (CVaR)

8. Sharpe-ratio & efficient frontier

PREREQUISITE

Regression Analysis

REFERENCES

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2. Tsay, R. S. (2013). An Introduction to Analysis of Financial Data with R (1st ed.). Hoboken, New Jersey: John Wiley & Sons, Inc.
3. Palczewski, A. (2018). LP Algorithms for Portfolio Optimization: The PortfolioOptim Package. R Journal 10 (1), 308-327.
4. Richard Brealey, Stewart Myers, Franklin Allen and Alex Edmans (2022). Principles of Corporate Finance. 14th Edition. McGraw-Hill.
5. Klugman, S.A., Panjer, H.H., Willmotm G.E., (2008), Loss Model : From Data to Decision, McGraw-Hill.
6. Jorion, P., (2007), Value at Risk: The New Benchmark for Managing Financial Risk, 3rd edition, McGraw-Hill
7. Kaas, R., Goovaerts, M., Dhaene, J. and Denuit, M., (2008), Modern Actuarial Risk Theory. Springer.
8. Wei, W. W. (2006). Time Series Analysis Univariate and Multivariate Methods (2nd ed.). Canada: Addison Wesley Publishing Company.
9. Hautsch, N. (2012). Econometrics of Financial High-Frequency Data. New York, Berlin, Heidelberg: Springer Verlag.
10. Borak, S., Härdle, W., and Hafner, C. (2011), Statistics of Financial Market: An Introduction, 3rd ed., Springer.
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