MODULE HANDBOOK

RISK ANALYSIS

BACHELOR DEGREE PROGRAM

DEPARTMENT OF STATISTICS

FACULTY OF SCIENCE AND DATA ANALYTICS

INSTITUT TEKNOLOGI SEPULUH NOPEMBER

ENDORSEMENT PAGE

	MODULE HANDBOOK RISK ANALYSIS **DEPARTMENT OF STATISTICS** **INSTITUT TEKNOLOGI SEPULUH NOPEMBER**

Proses ***Process***	**Penanggung Jawab** ***Person in Charge***			**Tanggal** ***Date***
	Nama ***Name***	**Jabatan** ***Position***	**Tanda tangan** ***Signature***	
Perumus *Preparation*	Dr.rer pol. Dedy Dwi Prastyo, S.Si, M.Si	Dosen *Lecturer*		**March 28, 2019**
Pemeriksa dan Pengendalian *Review and Control*	Dr.rer pol. Dedy Dwi Prastyo, S.Si, M.Si Imam Safawi Ahmad	Tim kurikulum *Curriculum team*		**April 15, 2019**
Persetujuan *Approval*	Dr. Ir. Setiawan, M.S	Koordinator RMK *Course Cluster Coordinator*		**July 17, 2019**
Penetapan *Determination*	Dr. Dra. Kartika Fithriasari, M.Si	Kepala Departemen *Head of Department*		**July 30, 2019**

MODULE HANDBOOK

RISK ANALYSIS

Module name	**Risk Analysis**
Module level	Undergraduate
Code	KS184650
Course (if applicable)	Risk Analysis
Semester	Sixth Semester (Genap)
Person responsible for the module	Dr.rer pol. Dedy Dwi Prastyo, S.Si
Lecturer	Dr.rer pol. Dedy Dwi Prastyo, S.Si, M.Si Imam Safawi Ahmad
Language	Bahasa Indonesia
Relation to curriculum	Undergraduate degree program, **elective**, 6th semester.
Type of teaching, contact hours	Lectures, <50 students
Workload	1. Lectures : 3 x 50 = 150 minutes per week. 2. Exercises and Assignments : 3 x 60 = 180 minutes (3hours) per week. 3. Private learning : 3 x 60 = 180 minutes (3 hours) per week.
Credit points	3 credit points (sks)
Requirements according to the examination regulations	A student must have attended at least 80% of the lectures to sit in the exams.
Mandatory prerequisites	• Probability Theory • Introduction to Economy Theory

Learning outcomes and their corresponding to PLOs	CLO.1 Explains the use of risk management concepts specifically in the financial industry CLO.2 Describe the risk management procedures in the financial industry	PLO.1
	CLO.3 Apply risk management in the problems of the financial industry CLO.4 Determine the appropriate method of risk management CLO.6 Have knowledge of current and future issues related to the field of risk management	PLO.3
	CLO.7 Able to communicate effectively and work together in interdisciplinary and multidisciplinary teams CLO.8 Have professional responsibilities and ethics CLO.9 Able to motivate yourself to think creatively and learn throughout life	PLO.4
Content	Risk analysis is a course that contains statistical methods for measuring risk in accordance with risk and financial theory. The results of this risk analysis can be used as a basis for decision making to determine risk diversification and investment portfolios. To achieve this goal, the learning strategies used are discussion, problem based learning (PBL), and exercises and assignments to perform real data analysis.	
Study and examination requirements and forms of examination	● In-class exercises ● Mid-term examination ● Final examination	
Media employed	LCD, whiteboard, websites (myITS Classroom), zoom.	

Reading list	1. Basel II Accord documentation. http://www.bis.org/publ/bebs107.htm 2. Borak, S., Härdle, W., and Hafner, C., 2011. *Statistics of Financial Market: An Introduction*. 3rd edition. Springer. 3. Hardle, W., Hautsch, N., and Overbeck L., 2008. *Applied Quantitative Finance*. 2nd edition. Springer. 4. Hautsch, N., 2012. *Econometrics of Financial High-Frequency Data*. New York, Berlin, Heidelberg: Springer Verlag. 5. Jorion, P., 2007. *Value at Risk: The New Benchmark for Managing Financial Risk*. 3rd edition. McGraw-Hill. 6. Kaas, R., Goovaerts, M., Dhaene, J. and Denuit, M., 2008. *Modern Actuarial Risk Theory*. Springer. 7. Klugman, S.A., Panjer, H.H., and Willmotm G.E., 2008. *Loss Model : From Data to Decision*. McGraw-Hill. 8. Tsay, R. S., 2013. *An Introduction to Analysis of Financial Data with R*. 1st edition. Hoboken, New Jersey: John Wiley dan Sons, Inc. 9. Wei, W. W., 2006. *Time Series Analysis Univariate and Multivariate Methods*. 2nd edition. Canada: Addison Wesley Publishing Company.

RENCANA PEMBELAJARAN SEMESTER (RPS)
SEMESTER LEARNING PLAN

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Bahan Kajian *Study Materials*	Teori Statistika, Deskripsi dan Eksplorasi, Pemodelan, Industri dan Bisnis, Ekonomi dan Manajemen *Statistics Theory, Description and Exploration, Modeling, Industrial and Business*
CPL yang dibebankan MK *PLO*	CPL-1 Mampu menerapkan pengetahuan teori statistika, matematika, dan komputasi CPL-3 Mampu menganalisis data dengan metode statistika yang tepat dan mengintepretasikannya CPL-4 Mampu mengindentifikasi,memformulasi, dan menyelesaikan masalah statistika di berbagai bidang terapan
CP-MK *CLO*	CPMK.1 Menjelaskan penggunaan konsep Manajemen Resiko secara khusus pada industri keuangan CPMK.2 Menjelaskan prosedur pengelolaan resiko dalam industri keuangan CPMK.3 Mengaplikasikan manajemen resiko dalam permasalahan industri keuangan CPMK.4 Menentukan metode yang sesuai dalam pengelolaan resiko CPMK.6 Memiliki pengetahuan tentang isu terkini dan mendatang yang berkaitan dengan bidang pengelolaan resiko CPMK.7 Mampu berkomunikasi secara efektif dan bekerjasama dalam tim yang interdisiplin dan multidisiplin CPMK.8 Memiliki tanggung jawab dan etika profesi CPMK.9 Mampu memotivasi diri untuk berpikir kreatif dan belajar sepanjang hayat

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Pertemuan ***Meeting***	**Kemampuan Akhir Sub CP-MK** ***Final Ability***	**Keluasan (materi pembelajaran)** ***Extent (learning material)***	**Metode Pembelajaran** ***Learning methods***	**Estimasi Waktu** ***Duration***	**Bentuk Evaluasi** ***Evaluation Type***	**Kriteria dan Indikator Penilaian** ***Assessment Criteria and Indicators***	**Bobot Penilaian** ***Scoring***
1.	Memahami konsep analisis investasi, antara lain nilai tunai, nilai mendatang, anuitas (anuitas akhir, anuitas awal & anuitas tertunda, dan obligasi). *Understand the concepts of investment analysis, including cash value, future value, annuities (late annuities, early &*	Review Matematika Keuangan meliputi Analisis Investasi (Nilai Tunai & Nilai Mendatang, Anuitas, dan obligasi) *Financial Mathematics Review includes Investment Analysis (Cash Value & Future Value, Annuities, and bonds)*	Ceramah Interaktif-Latihan Soal Diskusi (CILSD), Problem-based learning (PBL) *Interactive Lecture - Discussion Problem Exercises (CILSD),*	150 menit *150 Minutes*	Diskusi & Observasi Latihan & Tugas *Discussion & Observation Exercises & Assignments*	1. Mampu menerapkan konsep Analisis Investasi, antara lain Nilai Tunai, Nilai Mendatang & Anuitas Akhir. 2. Mampu menerapkan konsep Analisis Investasi Anuitas Awal, Anuitas Tertunda serta Obligasi. *1. Able to apply the concept of Investment Analysis, including Cash Value, Future Value & Final Annuity.* *2. Able to apply the concept of Initial Annuity Investment*	5%/5%

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	pending annuities, and bonds).		*Problem-based learning (PBL)*			*Analysis, Pending Annuity and Bonds.*	

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2	Memahami manajemen resiko, langkah-langkah dalam identifikasi, pengukuran (likelihood dan severity) serta pengelolaan resiko. *Understand risk management, the steps in identification, measurement (likelihood and severity) and risk management.*	1. Identifikasi Resiko 2. Pengukuran Resiko 3. Pengelolaan Resiko 1. Risk Identification 2. Risk Measurement 3. Risk Management	CILSD, PBL *CILSD, PBL*	150 menit *150 Minutes*	Diskusi & Observasi Latihan & Tugas *Discussion & Observation Exercises & Assignments*	1. Mampu menguasai serta menjelaskan pengertian Manajemen Resiko, langkah-langkah dalam identifikasi & pengukuran resiko. **2.** Mampu menguasai serta menjelaskan langkah-langkah dalam pengelolaan resiko. ***1.*** *Able to master and explain the meaning of risk management, the steps in risk identification & measurement.* ***2.*** *Able to master and explain the steps in risk management.*	5%/10%

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3	Memahami pengertian dan bentuk tabel kematian (mortality table), kematian awal, probabilitas dan eksposur kematian awal, interaksi probabilitas kematian awal dan severity kerugian. *Understand the definition and form of a mortality table, early mortality, probability and exposure of early death, interactions of*	**Resiko Kematian:** 1. Tabel Kematian 2. Probabilitas & Eksposur Kematian Awal 3. Interaksi Probabilitas Kematian Awal & *Severity* Kerugian ***Risk of Death:*** *1. Death Table Early Death* *2. Probability & Exposure* *3. Interaction of Probability of Early Death & Severity of Loss*	CILSD, PBL *CILSD, PBL*	150 menit *150 Minutes*	Diskusi & Observasi Latihan & Tugas *Discussion & Observation Exercises & Assignments*	1. Mampu menguasai serta menjelaskan mengenai Tabel Kematian CSO 1980 & 2001, Kematian Awal, serta Probabilitas & Eksposur Kematian Awal. 2. Mampu menjelaskan serta menerapkan Interaksi Probabilitas Kematian Awal & *Severity* Kerugian. *1. Able to master and explain the 1980 & 2001 CSO Death Table, Early Death, and Probability & Early Death Exposure.* *2. Able to explain and apply Probability of Early Death Interaction & Severity of Loss.*	5%/15%

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4-5	Mampu menjelaskan pengertian & terjadinya resiko pasar, serta dapat mengukur resiko pasar menggnakan pendekatan metode Deviasi standar, VaR:Historis, VaR:Analitis, dan VaR:Simulasi Monte Carlo. *Able to explain the meaning & occurrence of market risk, and be able to measure market risk using the standard deviation method approach, VaR: Historical, VaR:*	**Resiko Pasar:** 1. Metode Deviasi Standar 2. Metode Pengukuran Value at Risk (VaR) a. Metode Historis VaR b. Metode Analitis VaR c. Metode Simulasi Monte Carlo 3. Pendekatan *moving window* dalam penghitungan VaR ***Market Risk:*** *1. Standard Deviation Method* *2. Value at Risk (VaR) Measurement Method* *a. VaR Historical Method* *b. VaR Analytical Method* *c. Monte Carlo Simulation Methods*	CILSD, PBL *CILSD, PBL*	300 menit *300 Minutes*	Diskusi & Observasi Latihan & Tugas *Discussion & Observation Exercises & Assignments*	1. Mampu menguasai serta menjelaskan pengertian & terjadinya resiko pasar serta metode-metode pengukuran resiko pasar. 2. Mampu menghitung resiko pasar menggunakan metode VaR dengan pendekatan historis, analitis, simulasi Monte Carlo. 3. Mampu menerapkan pendekatan moving window dalam penghitungan VaR *1. Able to master and explain the meaning & occurrence of market risk and methods of measuring market risk.* *2. Able to calculate market risk using the VaR method with a*	15%/30%

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	Analytical, and VaR: Monte Carlo Simulation.	*3. Moving window approach in calculating VaR*				*historical, analytical, Monte Carlo simulation approach.* *3. Able to apply a moving window approach in calculating VaR*	

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6	Mampu membandingkan tingkat resiko dan return dari banyak instrument invetasi dan dapat melakukan diversifikasi portfolio *Able to compare the risk and return levels of many investment instruments and to diversify the portfolio*	3. Diversifikasi Portofolio a. Aset Independen b. Asset Dependen 4. *Backtesting* *3. Portfolio Diversification* *Independent Assets* *Dependent Assets* *4. Backtesting*	CILSD, PBL *CILSD, PBL*	150 menit *150 Minutes*	Diskusi & Observasi Latihan & Tugas *Discussion & Observation Exercises & Assignments*	1. Mampu membandingkan tingkat resiko dan return dari banyak instrument invetasi 2. Dapat menghitung kebaikan metode penghitungan VaR menggunakan *backtesting* 3. Dapat melakukan diversifikasi portfolio *1. Able to compare the level of risk and return of many investment instruments* *2. Can calculate the goodness of the VaR calculation method using backtesting* *3. Can diversify the portfolio*	10%/40%

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7	Metode pengukuran resiko dengan pendekatan non-parametrik *The method of measuring risk with a non-parametric approach*	Penghitungan VaR dengan pendekatan *Kernel Density Estimator* (KDE) *VaR calculation using the Kernel Density Estimator (KDE) approach*	CILSD, PBL *CILSD, PBL*	150 menit *150 Minutes*	Diskusi & Observasi Latihan & Tugas *Discussion & Observation Exercises & Assignments*	Mampu menghitung resiko dengan pendekatan nonparametrik *Able to calculate risk with a nonparametric approach*	10%/50%
8	**ETS**						

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9-10	Dapat menghitung resiko dari banyak asset yang tidak saling bebas Dapat menghitung resiko dari banyak asset yang tidak saling bebas *Can calculate the risk of many assets that are not mutually exclusive* *Can calculate the risk of many assets that are not mutually exclusive*	Penghitungan VaR untuk aset yang tidak saling bebas dengan pendekatan Copulae *VaR calculations for assets that are not mutually exclusive with the Copulae approach*	CILSD, PBL *CILSD, PBL*	300 menit *300 Minutes*	Diskusi & Observasi Latihan & Tugas *Discussion & Observation Exercises & Assignments*	Dapat menghitung resiko menggunakan VaR dengan pendekatan *Copulae* *Can calculate the risk using VaR with the Copulae approach*	15%/65%

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11-12		Pemodelan untuk penghitungan VaR menggunakan Conditional-VaR dan beberapa metode pemodelan terkini *Modeling for calculating VaR uses Conditional-VaR and some of the latest modeling methods*	CILSD, PBL *CILSD, PBL*	300 menit *300 Minutes*	Diskusi & Observasi Latihan & Tugas *Discussion & Observation Exercises & Assignments*	Dapat menghitung resiko dengan pendekatan Conditional-VaR *Can calculate risk with the Conditional-VaR approach*	10%/75%

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13-14	Dapat menghitung resiko yang melibatkan variabel eksogen *Can calculate risk involving exogenous variables*	Pemodelan VaR dengan pendekatan: 1. GARCH-X 2. ARMA-X dan GARCH-X 3. Regresi Kuantil *VaR modeling with the approach:* *1. GARCH-X* *2. ARMA-X and GARCH-X* *3. Quantile Regression*	CILSD, PBL *CILSD, PBL*	300 menit *300 Minutes*	Diskusi & Observasi Latihan & Tugas *Discussion & Observation Exercises & Assignments*	Dapat menghitung VaR dengan pendekatan ARMA-X dan GARCH-X, serta regresi kuantil *Can calculate VaR with ARMA-X and GARCH-X approaches, and quantile regression*	20%/95%

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15	Mengetahui isu-isu terkini dalam analisis resiko di bidang finansial *Knowing the current issues in risk analysis in the financial sector*	Pengenalan metode-metode mutakhir dalam pemodelan dan analisis resiko *Introduction of cutting-edge methods in risk modeling and analysis*	CILSD, PBL *CILSD, PBL*	150 menit *150 Minutes*	Diskusi & Observasi Latihan & Tugas *Discussion & Observation Exercises & Assignments*	Mahasiswa mengenal perkembangan metode terkni dalam analisis resiko di bidang finansial *Students are familiar with the development of this method in risk analysis in the financial sector*	5%/100%
16	**EAS**						

PUSTAKA/ REFERENCES :

1. Klugman, S.A., Panjer, H.H., Willmotm G.E., (2008), *Loss Model : From Data to Decision*, McGraw-Hill.
2. Jorion, P., (2007), Value at Risk: The New Benchmark for Managing Financial Risk, 3rd edition, McGraw-Hill
3. Kaas, R., Goovaerts, M., Dhaene, J. and Denuit, M., (2008), *Modern Actuarial Risk Theory*. Springer.
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8. Härdle, W., Hautsch, N., and Overbeck L. (2008), *Applied Quantitative Finance*, 2nd ed., Springer.
9. Basel II Accord documentation, http://www.bis.org/publ/bebs107.htm