MODULE HANDBOOK

FINANCIAL MATHEMATICS

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

ENDORSEMENT PAGE

	MODULE HANDBOOK **FINANCIAL MATHEMATICS** **STATISTICS UNDERGRADUATE PROGRAM** **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. Ir. Setiawan, M.Si	Dosen Lecturer		
Pemeriksa dan Pengendalian *Review and Control*	Dr. Ir. Setiawan, M.Si	Tim kurikulum Curriculum team		
Persetujuan *Approval*	Dr. Wibawati, S.Si., M.Si.	Koordinator RMK Course Cluster Coordinator		
Penetapan *Determination*	Dr. Kartika Fithriasari, M.Si	Kepala Departemen Head of Department		

MODULE HANDBOOK
FINANCIAL MATHEMATICS

Module name	FINANCIAL MATHEMATICS	
Module level	Undergraduate	
Code	SS234632	
Course (if applicable)	FINANCIAL MATHEMATICS	
Semester	6	
Person responsible for the module	Dr. Ir. Setiawan, M.Si	
Lecturer	Dr. Ir. Setiawan, M.Si	
Language	Bahasa Indonesia and English	
Relation to curriculum	Undergradute degree program, elective, 6th semester.	
Type of teaching, contact hours	Case Method (100%)	
Workload	1. Lectures [L] : 3 x 50 = 150 minutes per week. 2. Exercises and Assignments [EA] : 3 x 60 = 180 minutes (3 hours) per week. 3. Independent learning [IL]: 3 x 60 = 180 minutes (3 hours)perweek.	
Credit points	3 credit points (SKS) Equivalent to 4.8 ECTS	
Requirements according to the examination regulations	A student must have attended at least 80% of the lectures to sit in the exams.	
Mandatory prerequisites	Introduction to Statistical Methods	
Learning outcomes and their corresponding PLOs	CLO.1 Able to explain the concept of Financial Mathematics CLO.2. Able to formulate procedural problem solving CLO.3 Able to analyze data by applying the Statistical method in Financial Mathematics CLO.4. Able to identify, formulate, and solve statistical problems in the field of Financial Mathematics CLO.5 Able to use computational techniques and modern computer equipment needed to solve financial math problems CLO.6. Have knowledge of current and upcoming issues related to the field of Financial Mathematics CLO.7 Able to communicate effectively and work together in interdisciplinary and multidisciplinary teams	PLO-1 PLO-2 PLO-4

	CLO.8 Have professional responsibilities and ethics CLO.9 Able to motivate yourself to think creatively and learn throughout life	
Content	Financial mathematics is one of the courses in the field of Economics, Finance and Actuarial Statistics. Financial Mathematics study field to understand the concept of compensation related to financial lending / investment and its application. The purpose of studying financial mathematics is to be able to understand and apply / take into account various types of interest rates, present value, future value, basic annuities and general annuities (more general annuities), amortization and the amortization schedule and sinking fund method, bonds and yield rates. To achieve this goal, the learning method used is interactive lecture discussions and question exercises. As a subject that can be equated by the Indonesian Actuarial Association (PAI), the practice questions are derived from PAI exam questions and Society of Actuaries (SOA) questions so that students can sharpen their understanding and are trained to face cases of applying the concepts they have learned.	
Assessment and its weight	Study Case (25%) Project (30%) Cognitive - Midterm Exam (20%) Cognitive - Final Exam (25%)	
Media employed	LCD, whiteboard, websites (myITS Classroom), zoom	
Reading list	1. Kellison, S.G. 2008. The Theory of Interest. 3th edition. Mcgraw Hill. 2. Lyun, Y. 2002. Financial Engineering and Computation, Principles, Mathematics, Algorithms. Cambridengane.	

INSTITUT TEKNOLOGI SEPULUH NOPEMBER
FAKULTAS SAINS DAN ANALITIKA DATA
PROGRAM STUDI SARJANA STATISTIKA
DEPARTEMEN STATISTIKA

RENCANA PEMBELAJARAN SEMESTER/
SEMESTER LEARNING PLAN

MATA KULIAH (MK)/ *Course*	**KODE/** *Code*	**Rumpun MK/** *Course Group*	**BOBOT (sks)/** *Weight (credit)*		**SEMESTER/** *Semester*	**Tgl Penyusunan/** *Drafting Date*
MATEMATIKA KEUANGAN/ *FINANCIAL MATHEMATICS*	SS234632	ANDEF	**T=3**	**P=**	VI	11 Januari 2023/ *January 11, 2023*

OTORISASI/ *AUTHORIZATION*	**Pengembang RPS/** *RPS Developer*	**Koordinator RMK/** *Course Group Coordinator*	**Ketua PRODI/** *Head of Department*
	Dr. Ir. Setiawan, M.Si.	Dr. Ir. Setiawan, M.Si.	Dr. Kartika Fithriasari, M.Si

Capaian Pembelajaran (CP)/ *Learning Achievement*	**CPL-PRODI yang dibebankan pada 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 *PLO.1 Able to apply knowledge of statistical theory, mathematics, and computation.* *PLO.3 Able to analyze data with appropriate statistical methods and interpret them* *PLO.4 Able to identify, formulate, and solve statistical problems in various applied fields*	
	Capaian Pembelajaran Mata Kuliah (CPMK)/ *CLO*	

CPMK.1 Mampu menjelaskan konsep Matematika Keuangan
CPMK.2 Mampu memformulasikan penyelesaian masalah prosedural
CPMK.3 Mampu menganalisis data dengan mengaplikasikan metode Statistika dalam Matematika Keuangan
CPMK.4 Mampu mengindentifikasi,memformulasi, dan menyelesaikan masalah statistika di bidang Matematika Keuangan
CPMK.5 Mampu menggunakan teknik komputasi dan perangkat komputer modern yang diperlukan untuk menyelesaikan permasalahan matematika keuangan
CPMK.6 Memiliki pengetahuan tentang isu terkini dan mendatang yang berkaitan dengan bidang Matematika Keuangan
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
CLO.1 Able to explain the concept of Financial Mathematics
CLO.2. Able to formulate procedural problem solving
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CLO.5 Able to use computational techniques and modern computer equipment needed to solve financial math problems
CLO.6. Have knowledge of current and upcoming issues related to the field of Financial Mathematics
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

Matrik CPL – CPMK

PLO-CLO Matrix

CPMK/*CLO*	CPL-1/*PLO-1*	CPL-3/*PLO-3*	CPL-4/*PLO-4*
CPMK-1/*CLO-1*			
CPMK-2/*CLO-2*			
CPMK-3/*CLO-3*			
CPMK-4/*CLO-4*			
CPMK-5/*CLO-5*			
CPMK-6/*CLO-6*			
CPMK-7/*CLO-7*			
CPMK-8/*CLO-8*			
CPMK-9/*CLO-9*			

Deskripsi Singkat MK/ *Course Description*

Matematika keuangan merupakan salah satu mata kuliah di bidang Ilmu Ekonomi, Keuangan dan Statistika Aktuaria. Bidang studi Matematika Keuangan untuk memahami konsep kompensasi yang berkaitan dengan peminjaman keuangan/investasi dan penerapannya. Tujuan mempelajari matematika keuangan adalah untuk dapat memahami dan menerapkan/memperhitungkan berbagai macam suku bunga, nilai sekarang, nilai yang akan datang, anuitas dasar dan anuitas umum (anuitas yang lebih umum), amortisasi dan jadwal amortisasi serta metode sinking fund, obligasi dan tingkat imbal hasil. Untuk mencapai tujuan tersebut, metode pembelajaran yang digunakan adalah diskusi ceramah interaktif dan latihan soal. Sebagai mata kuliah yang dapat

	disetarakan oleh Persatuan Aktuaris Indonesia (PAI), latihan soal yang diberikan berasal dari soal-soal ujian PAI dan soal-soal Society of Actuaries (SOA) sehingga mahasiswa dapat mempertajam pemahaman dan terlatih untuk menghadapi kasus-kasus penerapan konsep-konsep yang telah dipelajari. *Financial mathematics is one of the courses in the field of Economics, Finance and Actuarial Statistics. Financial Mathematics study field to understand the concept of compensation related to financial lending / investment and its application. The purpose of studying financial mathematics is to be able to understand and apply / take into account various types of interest rates, present value, future value, basic annuities and general annuities (more general annuities), amortization and the amortization schedule and sinking fund method, bonds and yield rates. To achieve this goal, the learning method used is interactive lecture discussions and question exercises. As a subject that can be equated by the Indonesian Actuarial Association (PAI), the practice questions are derived from PAI exam questions and Society of Actuaries (SOA) questions so that students can sharpen their understanding and are trained to face cases of applying the concepts they have learned.*
Bahan Kajian: Materi Pembelajaran/ ***Course Material***	Matematika, Metode Statistika untuk Ekonomi atau Finansial, Pemodelan Statistika, Metode statistika Resmi atau Kependudukan *Mathematics, Statistical Methods for Economics or Finance, Statistical Modeling, Official or Population statistical methods*
Pustaka/ ***References***	**Utama/*Primary*:** 3. Kellison, S.G. 2008. The Theory of Interest. 3th edition. Mcgraw Hill. **Pendukung/*Secondary*:** 4. Lyun, Y. 2002. Financial Engineering and Computation, Principles, Mathematics, Algorithms. Cambridengane.
Dosen Pengampu/ ***Lecturers***	Dr. Ir. Setiawan, M.Si.
Matakuliah syarat/ ***Pre-requisite Course***	Pengantar Metode Statistika *Introduction to Statistical Methods*

Mg Ke- ***Week***	**Kemampuan akhir tiap tahapan belajar (Sub-CPMK)**	**Penilaian** ***Evaluation***	**Bantuk Pembelajaran, Metode Pembelajaran, Penugasan Mahasiswa, [Estimasi Waktu]**	**Materi Pembelajaran [Pustaka]** ***Learning Material [References]***	**Bobot Penilaian (%)** ***Evaluation***

	Final capability for each learning step			***Learning Format Learning Methods Assignment for Student [Estimated Time]***			***Weight (%)***
		Indikator ***Indicator***	**Kriteria & Bentuk** ***Criteria and Format***	**Luring** ***Offline***	**Daring** ***Online***		
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
1 ***1***	1.Mampu menjelaskan pengertian, jenis tingkat suku bunga dan perhitungannya *1. Able to explain the definition, types of interest rates and calculations*	1.1 Mampu menjelaskan pengertian suku bunga, tingkat suku bunga 1.2 Mampu memperhitungkan jenis tingkat bunga, nilai tunai, percepatan pembungaan, diskonto dan tingkat bunga tidak aktif *1.1 Able to explain the definition of interest rates, interest rates.* *1.2 Able to calculate the type of interest rate, cash value, acceleration of interest, discount, and inactive interest rate*	Tes Observasi Aktifitas (TOA) di kelas *Activity Observation Test (TOA) in class*	Ceramah Interaktif, Diskusi Latihan Soal *Interactive Lectures* *Discussion* *Exercise* **TM: 1×[3x50"]** **BM: 1×[3×60"]** **LT: 1×[3×60"]**		Tingkat Bunga ● Sederhana ● Majemuk ● Nilai mendatan ● Nilai sekarang *Interest Rate* *• Simple* *• Compound* *• Future value,* *• present value*	15% *15%*
2-3 ***2-3***	1. Mampu menerapkan persoalan Tingkat Bunga 2. *Able to apply Interest Rate issues*	2.1 Dapat menjelaskan dan memperhitungkan anuitas awal dan akhir, anuitas sembarang waktu 2.2 Mampu memperhitungkan rangkaian pembayaran	Tes Observasi Aktifitas (TOA) di Kelas Tugas 1 *Activity Observation Test (TOA) in*	Ceramah Interaktif, Diskusi Latihan Soal *Interactive Lectures* *Discussion* *Exercise*		Penerapan Tingkat Bunga *Application of Interest Rates*	15% *15%*

		abadi, waktu tidak diketahui, tingkat bunga tidak diketahui dan tidak tetap *2.1 Can describe and calculate beginning and ending annuities, annuities at any time.* *2.2 Be able to consider the series of perpetual payments, unknown time, unknown and variable interest rate*	*Class Assignment 1*	**TM: 2×[3x50"]** **BM: 2×[3×60"]** **LT: 2×[3×60"]**			
4-5 ***4-5***	3. Dapat menjelaskan Anuitas Tertentu *3. Can describe a Specific Annuity*	3.1 Dapat menjelaskan dan memperhitungkan anuitas awal dan akhir, anuitas sembarang waktu 3.2 Mampu memperhitungkan rangkaian pembayaran abadi, waktu tidak diketahui, tingkat bunga tidak diketahui dan tidak tetap *3.1 Can describe and calculate beginning and ending annuities, annuities at any time.* *3.2 Be able to consider the series of perpetual payments, unknown time, unknown and variable interest rate*	Tes Observasi Aktifitas (TOA) di kelas Tugas 2 *Activity Observation Test (TOA) in Class Assignment 2*	Ceramah Interaktif, Diskusi Latihan Soal *Interactive Lectures* *Discussion* *Exercise* **TM TM: 2×[3x50"]** **BM: 2×[3×60"]** **LT: 2×[3×60"]**		AnuitasTertentu Anuitas awal (annuity due) Anuitas akhir (annuity immediate) Nilai awal (present value) Nilai mendatang (future value) *Specific Annuity* *Annuity due* *Annuity immediate The initial value (present value)* *Future value*	15% *15%*
6-7 ***6-7***	4. Mampu menyekesaikan permasalahan Anuitas Umum	1. Dapat menjelaskan pengertian anuitas umum 2. Dapat	Tes Observasi Aktifitas (TOA) di kelas Kuis 1	Ceramah Interaktif, Diskusi Latihan Soal		Anuitas Umum *General Annuity*	15% *15%*

	4. Able to solve General Annuity problems	memperhitungkan periode pembayaran sama dan tidak sama 3. Mampu memperhitungkan permasalahan Anuitas kontinu, naik turun dan umum tidak konstan *4.1 Can explain the definition of a general annuity* *4.2 Can take into account the same and unequal payment periods* *4.3 Be able to take into account continuous, fluctuating and general annuity problems*	*Activity* *Observation Test (TOA) in Class* *Quiz 1*	*Interactive Lectures* *Discussion* *Exercise* **TM: 2×[3x50"]** **BM: 2×[3×60"]** **LT: 2×[3×60"]**			
8/*8*	**ETS/*Midterm***						
9-10 ***9-10***	5. Dapat menjelaskan dan menerapkan Amortisasi dan Cadangan Pelunasan Hutang *5. Can explain and apply Amortization and Reserve for Settlement of Accounts Payable*	6.1 Mampu menjelaskan persoalan amortisasi 6.2 Mampu memperhitungkan metode cadangan pelunasan hutang *6.3 Able to explain amortization problems* *6.4 Able to calculate the reserve method of debt settlement*	Tes Observasi Aktifitas (TOA) di Kelas Tugas 3 *Activity* *Observation Test (TOA) in Class* *Assignment 3*	Ceramah Interaktif, Diskusi Latihan Soal *Interactive Lectures* *Discussion* *Exercise* **TM: 2×[3x50"]** **BM: 2×[3×60"]** **LT: 2×[3×60"]**		Amortisasi dan Metode Cadangan Pelunasan Hutang *Amortization and Reserve Methods for Settlement of Accounts Payable*	15% *15%*
11-13 ***11-13***	6. Dapat menjelaskan pengertian dan menerapkan perhitungan Obligasi *6. Can explain the*	5.1 Dapat menjelaskan dan memperhitungkan pada berbagai harga dan tingkat bunga obligasi 5.2 Dapat	Tes Observasi Aktifitas (TOA) di kelas Tugas 3 *Activity*	Ceramah Interaktif, Diskusi Latihan Soal *Interactive Lectures* *Discussion*		Obligasi *Bounds*	15% *15%*

	definition and apply the calculation of bonds	memperhitungkan Harga obligasi tanggal dan bulan *5.1 Can explain and calculate the various prices and interest rates on bonds* *5.2 Can calculate the date and month bond prices*	*Observation Test (TOA) in Class Assignment 3*	*Exercise* **TM: 3×[3x50"]** **BM: 3×[3×60"]** **LT: 3×[3×60"]**			
14-15 ***14-15***	7. Dapat menerapkan dan menganalisa tingkat pengembalian Modal *7. Can apply and analyze the rate of return on capital*	7.1 Dapat menganalisia kas diskonto, TB reinvestasi 7.2 Dapat memperhitungkan tingkat bunga penanaman modal dan capital budgeting *7.1 Can analyze discounted cash, TB reinvestment* *7.2 Can calculate the interest rate for investment and capital budgeting*	Tes Observasi Aktifitas (TOA) di Kelas Tugas 4 *Activity Observation Test (TOA) in Class Assignment 4*	Ceramah Interaktif, Diskusi Latihan Soal *Interactive Lectures* *Discussion* *Exercise* **TM: 2×[3x50"]** **BM: 2×[3×60"]** **LT: 2×[3×60"]**		Tingkat Pengembalian Modal *Rate of Return on Capital*	10% *10%*
16/*16*	**Evaluasi Akhir Semester / *Final Exam***						