

MODULE HANDBOOK

**FINANCIAL
MATHEMATICS**



BACHELOR DEGREE PROGRAM

DEPARTMENT OF STATISTICS

FACULTY OF SCIENCE AND DATA ANALYTICS

INSTITUT TEKNOLOGI SEPULUH NOPEMBER

ENDORSEMENT**PAGE****MODULE HANDBOOK FINANCIAL
MATHEMATICS
DEPARTMENT OF STATISTICS
INSTITUT TEKNOLOGI SEPULUH NOPEMBER**

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

MODULE HANDBOOK


FINANCIAL MATHEMATICS

Module name	Financial Mathematics
Module level	Undergraduate
Code	KS184537
Course (if applicable)	Financial Mathematics
Semester	Fifth Semester (Ganjil)
Person responsible for the module	Dr. Ir. Setiawan, M.S
Lecturer	Imam Safawi. A Dr. Bustanul Arifin, M.Sc
Language	Bahasa Indonesia and English
Relation to curriculum	Undergraduate degree program, elective , 5 th semester.
Type of teaching, contact hours	Lectures, <50 students
Workload	<ol style="list-style-type: none"> 1. Lectures : 3 x 50 = 150 minutes per week. 2. Exercises and Assignments : 3 x 60 = 180 minutes (3 hours) 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	Introduction to Statistical Method	
Learning outcomes and their corresponding to PLOs	CLO.1 Able to explain the concept of Financial Mathematics CLO.2. Able to formulate procedural problem solving	PLO.1
	CCLO.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	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	<p>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 .</p>	

<p>Study and examination requirements and forms of examination</p>	<ul style="list-style-type: none"> ● In-class exercises ● Mid-term examination ● Final examination
<p>Media employed</p>	<p>LCD, whiteboard, websites (myITS Classroom), zoom.</p>
<p>Reading list</p>	<ol style="list-style-type: none"> 1. Kellison, S.G. 2008. <i>The Theory of Interest</i>. 3th edition. Mcgraw Hill. 2. Lyun, Y. 2002. <i>Financial Engineering and Computation, Principles, Mathematics, Algorithms</i>. Cambridengane.

RENCANA PEMBELAJARAN SEMESTER (RPS)
SEMESTER LEARNING PLAN

	Program Studi	Sarjana, Departemen Statistika, FSAD-ITS
	Mata Kuliah	Matematika Keuangan
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Bahan Kajian <i>Study Materials</i>	<p>Dasar Sains, Teori Statistika, Pengumpulan Data, Deskripsi dan Eksplorasi, Komputasi dan Data Processing, Pemodelan, Industri dan Bisnis</p> <p><i>Statistics Theory, Collecting Data, Description and Exploration, Computation and Data Processing, Modeling, Industrial and Business</i></p>
CPL yang dibebankan MK <i>PLO</i>	<p>CPL-1 Mampu menerapkan pengetahuan teori statistika, matematika, dan komputasi</p> <p>CPL-3 Mampu menganalisis data dengan metode statistika yang tepat dan menginterpretasikannya</p> <p>CPL-4 Mampu mengidentifikasi, memformulasi, dan menyelesaikan masalah statistika di berbagai bidang terapan</p> <p><i>PLO.1 Able to apply knowledge of statistical theory, mathematics, and computation</i></p> <p><i>PLO.3 Able to analyze data with appropriate statistical methods and interpret them</i></p> <p><i>PLO.4 Able to identify, formulate, and solve statistical problems in various applied fields</i></p>

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CP-MK <i>CLO</i>	<p>CPMK.1 Mampu menjelaskan konsep Matematika Keuangan</p> <p>CPMK.2 Mampu memformulasikan penyelesaian masalah prosedural</p> <p>CPMK.3 Mampu menganalisis data dengan mengaplikasikan metode Statistika dalam Matematika Keuangan</p> <p>CPMK.4 Mampu mengidentifikasi, memformulasi, dan menyelesaikan masalah statistika di bidang Matematika Keuangan</p> <p>CPMK.5 Mampu menggunakan teknik komputasi dan perangkat komputer modern yang diperlukan untuk menyelesaikan permasalahan matematika keuangan</p> <p>CPMK.6 Memiliki pengetahuan tentang isu terkini dan mendatang yang berkaitan dengan bidang Matematika Keuangan</p> <p>CPMK.7 Mampu berkomunikasi secara efektif dan bekerjasama dalam tim yang interdisiplin dan multidisiplin</p> <p>CPMK.8 Memiliki tanggung jawab dan etika profesi</p> <p>CPMK.9 Mampu memotivasi diri untuk berpikir kreatif dan belajar sepanjang hayat</p> <p><i>CLO.1 Able to explain the concept of Financial Mathematics</i></p> <p><i>CLO.2. Able to formulate procedural problem solving</i></p> <p><i>CLO.3 Able to analyze data by applying the Statistical method in Financial Mathematics</i></p> <p><i>CLO.4. Able to identify, formulate, and solve statistical problems in the field of Financial Mathematics</i></p> <p><i>CLO.5 Able to use computational techniques and modern computer equipment needed to solve financial math problems</i></p> <p><i>CLO.6. Have knowledge of current and upcoming issues related to the field of Financial Mathematics</i></p> <p><i>CLO.7 Able to communicate effectively and work together in interdisciplinary and multidisciplinary teams</i></p> <p><i>CLO.8 Have professional responsibilities and ethics</i></p> <p><i>CLO.9 Able to motivate yourself to think creatively and learn throughout life</i></p>
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Pertemuan <i>Meeting</i>	Kemampuan Akhir Sub CP-MK <i>Final Ability</i>	Keluasan (materi pembelajaran) <i>Extent (learning material)</i>	Metode Pembelajaran <i>Learning methods</i>	Estimasi Waktu <i>Duration</i>	Bentuk Evaluasi <i>Evaluation Type</i>	Kriteria dan Indikator Penilaian <i>Assessment Criteria and Indicators</i>	Bobot Penilaian <i>Scoring</i>
1	<p>1. Mampu menjelaskan pengertian, jenis tingkat suku bunga dan perhitungannya</p> <p><i>1. Able to explain the definition, types of interest rates and calculations</i></p>	<p>Tingkat Bunga</p> <ul style="list-style-type: none"> • Sederhana • Majemuk • Nilai mendatan • nilai sekarang <p><i>Interest Rate</i></p> <ul style="list-style-type: none"> • <i>Simple</i> • <i>Compound</i> • <i>Future value,</i> • <i>present value</i> 	<p>1. Ceramah Interaktif Diskusi (CID)</p> <p>2. Latihan Soal (LS)</p> <p><i>1. Interactive Lecture Discussion (CID)</i></p> <p><i>2. Exercise (LS)</i></p>	<p>150 menit</p> <p><i>150 minutes</i></p>	<p>Tes Observasi Aktifitas (TOA) di kelas</p> <p><i>Activity Observation Test (TOA) in class</i></p>	<p>1. Mampu menjelaskan pengertian suku bunga, tingkat suku bunga</p> <p>2. Mampu memperhitungkan jenis tingkat bunga, nilai tunai, percepatan pembungaan, diskonto dan tingkat bunga tidak aktif</p> <p><i>1. Able to explain the definition of interest rates, interest rates</i></p> <p><i>2. Able to calculate the type of interest rate, cash value, acceleration of interest, discount and inactive interest rate</i></p>	15%/15 %



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2-3	<p>2. Mampu menerapkan persoalan Tingkat Bunga</p> <p><i>2. Able to apply Interest Rate issues</i></p>	<p>Penerapan Tingkat Bunga</p> <p><i>Application of Interest Rates</i></p>	<p>1. Ceramah Interaktif Diskusi (CID)</p> <p>2. Latihan Soal (LS)</p> <p><i>1. Interactive Lecture Discussion (CID)</i></p> <p><i>2. Exercise (LS)</i></p>	<p>300 menit</p> <p><i>300 minutes</i></p>	<p>Tes Observasi Aktifitas (TOA) di kelas Tugas 1</p> <p><i>Activity Observation Test (TOA) in class Assignment 1</i></p>	<p>1. Mampu menjelaskan dan memperhitungkan persamaan nilai.</p> <p>2. Mampu memperhitungkan permasalahan jangka waktu dan tingkat bunga tak diketahui</p> <p>3. Mampu memperhitungkan periode waktu tingkat bunga</p> <p><i>1. Able to explain and calculate equality of values.</i></p> <p><i>2. Able to calculate the problem of unknown time period and interest rate</i></p> <p><i>3. Able to calculate the interest rate time period</i></p>	<p>15%/30 %</p>
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4-5	<p>3. Dapat menjelaskan Anuitas Tertentu</p> <p><i>3. Can describe a Specific Annuity</i></p>	<p>Anuitas Tertentu</p> <p>Anuitas awal (<i>annuity due</i>)</p> <p>Anuitas akhir (<i>annuity immediate</i>)</p> <p>Nilai awal (<i>present value</i>)</p> <p>Nilai mendatang (<i>future value</i>)</p> <p><i>Annuity Specific</i></p> <p><i>Annuity due</i></p> <p><i>Annuity immediate</i></p> <p><i>The initial value (present value)</i></p> <p><i>Future value</i></p>	<p>1. Ceramah Interaktif Diskusi (CID)</p> <p>2. Latihan Soal (LS)</p> <p><i>1. Interactive Lecture Discussion (CID)</i></p> <p><i>2. Exercise (LS)</i></p>	<p>300 menit</p> <p><i>300 minutes</i></p>	<p>Tes Observasi Aktifitas (TOA) di kelas</p> <p>Tugas 2</p> <p><i>Activity Observation Test (TOA) in class Assignment 2</i></p>	<p>1. Dapat menjelaskan dan memperhitungkan anuitas awal dan akhir, anuitas sembarang waktu</p> <p>2. Mampu memperhitungkan rangkaian pembayaran abadi, waktu tidak diketahui, tingkat bunga tidak diketahui dan tidak tetap</p> <p><i>1. Can describe and calculate beginning and ending annuities, annuities at any time</i></p> <p><i>2. Be able to take into account the series of perpetual payments, unknown time, unknown and variable interest rate</i></p>	<p>15%/45 %</p>
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6-7	<p>4. Mampu menyelesaikan permasalahan Anuitas Umum</p> <p><i>4. Able to solve General Annuity problems</i></p>	<p>Anuitas Umum</p> <p><i>General Annuity</i></p>	<p>1. Ceramah Interaktif Diskusi (CID)</p> <p>2. Latihan Soal (LS)</p> <p><i>1. Interactive Lecture Discussion (CID)</i></p> <p><i>2. Exercise (LS)</i></p>	<p>300 menit</p> <p><i>300 minutes</i></p>	<p>Tes Observasi Aktifitas (TOA) di kelas Kuis 1</p> <p><i>Activity Observation Test (TOA) in class Quiz 1</i></p>	<p>1. Dapat menjelaskan pengertian anuitas umum</p> <p>2. Dapat memperhitungkan periode pembayaran sama dan tidak sama</p> <p>3. Mampu memperhitungkan permasalahan Anuitas kontinu, naik turun dan umum tidak konstan</p> <p><i>1. Can explain the definition of a general annuity</i></p> <p><i>2. Can take into account the same and unequal payment periods</i></p> <p><i>3. Be able to take into account continuous, fluctuating and general annuity problems</i></p>	<p>15%/60 %</p>
8	ETS						



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9-10	<p>5. Dapat menjelaskan dan menerapkan Amortisasi dan Cadangan Pelunasan Hutang</p> <p><i>5. Can explain and apply Amortization and Reserve for Settlement of Accounts Payable</i></p>	<p>Amortisasi dan Metode Cadangan Pelunasan Hutang</p> <p><i>Amortization and Reserve Methods for Settlement of Accounts Payable</i></p>	<p>1. Ceramah Interaktif Diskusi (CID)</p> <p>2. Latihan Soal (LS)</p> <p><i>1. Interactive Lecture Discussion (CID)</i></p> <p><i>2. Exercise (LS)</i></p>	<p>300 menit</p> <p><i>300 minutes</i></p>	<p>Tes Observasi Aktifitas (TOA) di kelas Tugas 3</p> <p><i>Activity Observation Test (TOA) in class Assignment 3</i></p>	<p>1. Mampu menjelaskan persoalan amortisasi</p> <p>2. Mampu memperhitungkan metode cadangan pelunasan hutang</p> <p><i>1. Able to explain amortization problems</i></p> <p><i>2. Able to calculate the reserve method of debt settlement</i></p>	<p>15%/75 %</p>
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11-13	<p>6. Dapat menjelaskan pengertian dan menerapkan perhitungan Obligasi</p> <p><i>6. Can explain the definition and apply the calculation of bonds</i></p>	<p>Obligasi</p> <p><i>bonds</i></p>	<p>1. Ceramah Interaktif Diskusi (CID)</p> <p>2. Latihan Soal (LS)</p> <p><i>1. Interactive Lecture Discussion (CID)</i></p> <p><i>2. Exercise (LS)</i></p>	<p>450 menit</p> <p><i>450 minutes</i></p>	<p>Tes Observasi Aktifitas (TOA) di kelas Tugas 4</p> <p><i>Activity Observation Test (TOA) in class Assignment 4</i></p>	<p>1. Dapat menjelaskan dan memperhitungkan pada berbagai harga dan tingkat bunga obligasi</p> <p>2. Dapat memperhitungkan Harga obligasi tanggal dan bulan</p> <p><i>1. Can explain and calculate the various prices and interest rates on bonds</i></p> <p><i>2. Can calculate the date and month bond prices</i></p>	15%/90 %
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14-15	<p>7. Dapat menerapkan dan menganalisa tingkat pengembalian Modal</p> <p><i>7. Can apply and analyze the rate of return on capital</i></p>	<p>Tingkat Pengembalian Modal</p> <p><i>Rate of Return on Capital</i></p>	<p>1. Ceramah Interaktif Diskusi (CID)</p> <p>2. Latihan Soal (LS)</p> <p><i>1. Interactive Lecture Discussion (CID)</i></p> <p><i>2. Exercise (LS)</i></p>	<p>300 menit</p> <p><i>300 minutes</i></p>	<p>Tes Observasi Aktifitas (TOA) di kelas Kuis 2</p> <p><i>Activity Observation Test (TOA) in class Quiz 2</i></p>	<p>1. Dapat menganalisa kas diskonto, TB reinvestasi</p> <p>2. Dapat memperhitungkan tingkat bunga penanaman modal dan <i>capital budgeting</i></p> <p><i>1. Can analyze discounted cash, TB reinvestment</i></p> <p><i>2. Can calculate the interest rate for investment and capital budgeting</i></p>	<p>10%/100 %</p>
16	EAS						

PUSTAKA/ REFERENCES:

1. Kellison, S.G. (2008). *The Theory of Interest*. 5th Ed. Burr Pedge, Il Irwin.
2. Lyun, Yuh-Dueh. (2002). *Financial Engineering and Computation, Principles, Mathematics, Algorithms*. Cambridge.