

SEMESTER LEARNING PLAN

**INSURANCE MATHEMATICS COURSES
(23H01131103)**



TEACHING TEAM

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STUDI PROGRAM OF MATHEMATICS - S1
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
HASANUDDIN UNIVERSITY
MAKASSAR
2025

**STUDY PROGRAM OF MATEMATIKA - S1
FACULTY OF MATHEMATICS AND NATURAL SCIENCES
HASANUDDIN UNIVERSITY**

Vision

The scientific vision is to become a study program with an international reputation in the development of mathematics based on the Indonesian maritime continent by 2030

Vision Strategy

Mission

To fulfill the above vision, the Undergraduate Mathematics Study Program has four missions, namely:

- Organizing innovative and effective mathematics learning to improve the quality and creativity of students in order to compete nationally and internationally.
- Improving a research culture that produces internationally reputable publications.
- Playing an active role in community service activities and collaborating with other academic institutions, government, business, media and society.
- Carry out governance in the Mathematics Study Program that is effective, efficient and transparent based on IT and ISO 9001:2015 standards to achieve the tridharma goals.

Graduate Profiles

Gagal diterjemahkan

PLO charged to courses

CPL-3 (KU1) - The students are able to analyse a mathematical problem with logic, analytic, and systematic structure

CPL-7 (KK3) - The students are able to demonstrate mathematical skills which include interpretation, connecting problems, solving problems, and communicating individually or teamwork

Course Learning Outcomes (CLO)

CPMK-1: Students will be able to apply mathematical methods, data management, analysis, interpretation based on mathematical and statistical concepts. (CPL3 dan CPL7)

CPMK-2: Students will be able to apply statistics in building models, laws of probability, applications in the fields of business, industry, health, population, programming, as well as making reports and presentations. (CPL7)

CPMK-3: Students will be able to adapt to society, the work environment, communicate, work together in teams and be responsible. (CPL3 dan CPL7)

Sub-CLO

Sub CPMK-1: Able to calculate interest rates, initial annuity, final annuity, continuous annuity. (CPMK-1 dan CPMK-2)

Sub CPMK-2: Able to explain the concept of survival function, time of death for someone aged x , curtate future lifetime, and force of mortality. (CPMK-1 dan CPMK-2)

Sub CPMK-3: Able to calculate probability values from mortality tables, as well as analyze the relationship between mortality tables and survival functions. (CPMK-2 dan CPMK-3)

Sub CPMK-4: Able to explain the different properties of mortality tables, recursive formulas, and assumptions for fractional age. (CPMK-1 dan CPMK-3)

Sub CPMK-5: Able to distinguish between types of insurance with discrete and continuous time. Able to

determine the life insurance relationship between discrete and continuous time. (CPMK-1 dan CPMK-2)

Sub CPMK-6: Able to calculate the value of discrete, continuous, m-times, due and immediate annuities. (CPMK-2 dan CPMK-3)

Sub CPMK-7: Able to calculate the value of benefit premiums with discrete, continuous and m-time payments. (CPMK-2 dan CPMK-3)

Learning Analytics

Insurance Mathematics



Able to calculate the value of benefit premiums with discrete, continuous and m-time payments. (CPMK-3 dan CPMK-2)



Able to calculate the value of discrete, continuous, m-times, due and immediate annuities. (CPMK-2 dan CPMK-3)



Able to distinguish between types of insurance with discrete and continuous time. Able to determine the life insurance relationship between discrete and continuous time. (CPMK-1 dan CPMK-2)



Able to explain the different properties of mortality tables, recursive formulas, and assumptions for fractional age. (CPMK-1 dan CPMK-3)



Able to calculate probability values from mortality tables, as well as analyze the relationship between mortality tables and survival functions. (CPMK-2 dan CPMK-3)



Able to explain the concept of survival function, time of death for someone aged x, curtate future lifetime, and force of mortality. (CPMK-1 dan CPMK-2)



Able to calculate interest rates, initial annuity, final annuity, continuous annuity. (CPMK-1 dan CPMK-2)

Have passed the course Statistical Methods



HASANUDDIN UNIVERSITY

FAKULTY OF MATHEMATICS AND NATURAL SCIENCES

STUDY PROGRAM OF MATHEMATICS - S1

SEMESTER LEARNING PLAN

Course		Code	Course Group	Credits	SEMESTER	Compilation Date
Insurance Mathematics		23H01131103		3	5	10 Agustus 2024
AUTHORITY		SLP Developer Lecturer		Coordinator		Head of Study Program
		Prof. Dr. Aidawayati Rangkuti, MS., Ainun Mawaddah Abdal, S.Si.,M.Si.		Prof. Dr. Aidawayati Rangkuti, MS.		Dr. Firman, S.Si.,M.Si.
Learning Outcomes Course	SLOs that are imposed on the course					
	SLO-3:	Mahasiswa mampu menganalisis suatu masalah matematika dengan logika, analitik, dan struktur sistematis				
	SLO-7:	Mahasiswa dapat menunjukkan keterampilan matematika termasuk menghubungkan masalah, menyelesaikan masalah, interpretasi, dan berkomunikasi secara individu atau dengan kerja tim				
	SLO ⇒ Course Learning Outcomes					
	After completing this course, it is expected:					
	SLO-7	CLO-1: Students will be able to apply mathematical methods, data management, analysis, interpretation based on mathematical and statistical concepts.				
		CLO-2: Students will be able to apply statistics in building models, laws of probability, applications in the fields of business, industry, health, population, programming, as well as making reports and presentations.				
		CLO-3: Students will be able to adapt to society, the work environment, communicate, work together in teams and be responsible.				
	SLO-3	CLO-1: Students will be able to apply mathematical methods, data management, analysis, interpretation based on mathematical and statistical concepts.				
		CLO-3: Students will be able to adapt to society, the work environment, communicate, work together in teams and be responsible.				
	CLO ⇒ Sub-CLO					
	CLO-1	Sub-CLO-1:Able to calculate interest rates, initial annuity, final annuity, continuous annuity.				
		Sub-CLO-2:Able to explain the concept of survival function, time of death for someone aged x, curtate future lifetime, and force of mortality.				
		Sub-CLO-4:Able to explain the different properties of mortality tables, recursive formulas, and assumptions for fractional age.				
		Sub-CLO-5:Able to distinguish between types of insurance with discrete and continuous time.Able to determine the life insurance relationship between discrete and continuous time.				

	CLO-2	Sub-CLO-1:Able to calculate interest rates, initial annuity, final annuity, continuous annuity.						
		Sub-CLO-2:Able to explain the concept of survival function, time of death for someone aged x, curtate future lifetime, and force of mortality.						
		Sub-CLO-3:Able to calculate probability values from mortality tables, as well as analyze the relationship between mortality tables and survival functions.						
		Sub-CLO-5:Able to distinguish between types of insurance with discrete and continuous time.Able to determine the life insurance relationship between discrete and continuous time.						
		Sub-CLO-6:Able to calculate the value of discrete, continuous, m-times, due and immediate annuities.						
		Sub-CLO-7:Able to calculate the value of benefit premiums with discrete, continuous and m-time payments.						
	CLO-3	Sub-CLO-3:Able to calculate probability values from mortality tables, as well as analyze the relationship between mortality tables and survival functions.						
		Sub-CLO-4:Able to explain the different properties of mortality tables, recursive formulas, and assumptions for fractional age.						
		Sub-CLO-6:Able to calculate the value of discrete, continuous, m-times, due and immediate annuities.						
		Sub-CLO-7:Able to calculate the value of benefit premiums with discrete, continuous and m-time payments.						
Correlation between SLOs/CLOs to Sub-CLOs								
SLOs that are charged on the Course	CPMK	SUB CPMK	Form of Assessment*			Weight	Value	Student Score
			Formative	Sumative				
				Independent Assignment	Case Studies			
SLO-7	CLO-2	SUB-CLO-1	activeness in class	10	0	10		
SLO-7	CLO-2	SUB-CLO-2	activeness in class	0	10	10		
SLO-7	CLO-3	SUB-CLO-3	Liveliness	0	20	20		
SLO-7	CLO-2	SUB-CLO-5	activeness in class and Activeness	20	20	40		
SLO-7	CLO-2	SUB-CLO-7	activeness in class	0	20	20		
				30	70	100		
Course Description	In this course students will learn about the basic concepts of calculations in the field of insurance, such as: life annuities, actuarial present value, types of life insurance, and premium calculations.							

Learning Materials/Subjects		1. Interest concept (interest rate concept) 2. Survival distribution and mortality table (Survival distribution and mortality tabel) 3. Life insurance (Life Insurance) 4. Life annuity (Life annuities) 5. Premium Benefits					
Reference		Main References					
		1. Bowers, Newton L., et al. 1997. Actuarial Mathematics. Second Edition. The Society of Actuaries. United States of America. 2. Gupta, A.K. and Varga, T., 2013. An introduction to actuarial mathematics (Vol. 14). Springer Science & Business Media. 3. Gerber, H.U., 2013. Life insurance mathematics. Springer Science & Business Media					
		Additional References					
		1. Cunningham, R.J, et al. 2006. Model for Quantifying Risk (Second Edition). ACTEX Publication.Inc. United States of America. 2. Takashi Futami, 1993. “Actuarial Mathematics Part I” Co, LTD, Tokyo, Japan					
Teaching Team		Prof. Dr. Aidawayati Rangkuti, MS., Ainun Mawaddah Abdal, S.Si.,M.Si.					
Course requirement		Statistical Methods					
Week	Sub CPMK (End-of-stage learning ability)	Penilaian (Assesment)		Learning Forms and Methods [time estimate]		Content	Weight of Assessment (%)
		Indicator	Techniques & Criteria	Offline	Online		
1	2	3	4	5	6	7	8

1-2	Able to calculate interest rates, initial annuity, final annuity, continuous annuity. (CPMK-1, CPMK-2)	Formative: Participants actively discuss in class Sumative: Completeness in providing examples in daily life cases related to the concept of survival function, time of death/curtate future lifetime, calculating the force of mortality correctly and providing correct interpretations	Formative Criteria: activeness in class Sumative Criteria: Independent Assignment (10) dinilai dengan rubrik 01 Assessment Technique: Non Test	Studying: Discovery Learning 2x(3x50")	Response and Tutorial: Case Study (Case Study) 2x(3x50")	Survival distribution and mortality table: Function survival, time of death for someone aged x, curtate future lifetime, and force of mortality.	10
3-5	Able to explain the concept of survival function, time of death for someone aged x, curtate future lifetime, and force of mortality. (CPMK-1, CPMK-2)	Formative: Participants actively discuss in class Sumative: Accuracy in completing mortality tables using fractional age assumptions correctly and understand the properties of mortalias tables and accuracy in calculating the value of the chance of survival and the chance of death	Formative Criteria: activeness in class Sumative Criteria: Case Studies (10) dinilai dengan rubrik 02 Assessment Technique: Test and Non-Test	Studying: Group discussion (Small Group Discussion) 3x(3x50")	Response and Tutorial: Self-Directed Learning 1x(3x50")	Survival distribution and mortality table: table properties mortality, recursive formulas, and assumptions for fractional age.	10

6-8	Able to calculate probability values from mortality tables, as well as analyze the relationship between mortality tables and survival functions. (CPMK-2, CPMK-3)	Formative: Active participants in class discussions. Sumative: Accuracy in calculating probability values from the mortality table, as well as analyzing the relationship between the mortality table and the survival function	Formative Criteria: Liveliness dinilai dengan rubrik 04 Sumative Criteria: Case Studies (20) dinilai dengan rubrik 04 Assessment Technique: Gagal diterjemahkan	Studying: Case Study (Case Study) TM: 3x3x50; PT: 3x3x60; BM: 3x3x50.		Gagal diterjemahkan	20
9-10	Able to distinguish between types of insurance with discrete and continuous time. Able to determine the life insurance relationship between discrete and continuous time. (CPMK-1, CPMK-2)	Formative: Participants actively discuss in class Sumative: Accuracy in calculating insurance benefits for all types of insurance with continuous time in case applications correctly.	Formative Criteria: activeness in class Sumative Criteria: Independent Assignment (20) dinilai dengan rubrik 01 Assessment Technique: Test and Non-Test	Studying: Cooperative learning (Cooperative learning) 2x(3x50")	Studying: Case Study (Case Study) 12(3x50")	Life insurance: Types of life insurance using continuous time and the relationship between discrete and continuous time.	20
11-13	Able to distinguish between types of insurance with discrete and continuous time. Able to determine the life insurance relationship between discrete and continuous time. (CPMK-1, CPMK-2)	Formative: Participants actively discuss in class Sumative: Precision in distinguishes between discrete and continuous time types of insurance. Able to determine the life insurance relationship between discrete and continuous time	Formative Criteria: Liveliness dinilai dengan rubrik 04 Sumative Criteria: Case Studies (20) dinilai dengan rubrik 02 Assessment Technique: Gagal diterjemahkan	Studying: Cooperative learning (Cooperative learning) This material was presented by: Drs Riso Gojantoro, risk management practitioner [3x3x60]		Gagal diterjemahkan	20

14-16	Able to calculate the value of benefit premiums with discrete, continuous and m-time payments. (CPMK-3, CPMK-2)	Formative: Participants actively discuss in class Sumative: Kaccuracy of the premium value calculation results in the case example given and explaining the results obtained.	Formative Criteria: activeness in class Sumative Criteria: Case Studies (20) dinilai dengan rubrik 02 Assessment Technique: Test and Non-Test	Research, Design, or Development: Case Study (Case Study) 3x(3x50")	Research, Design, or Development: Case Study (Case Study) 3x(3x50")	Premium benefits: Discrete, continuous and payout insurance m-times.	20
							100

Matrix of SLO, CLO, and Assessment Method

SLO / CLO	CLO-1	CLO-2	CLO-3
CPL-3 (KU1)	Independent Assignment (Weight 10%) Case Studies (Weight 10%) Independent Assignment (Weight 20%) Case Studies (Weight 20%)		Case Studies (Weight 20%) Case Studies (Weight 20%)
CPL-7 (KK3)	Independent Assignment (Weight 10%) Case Studies (Weight 10%) Independent Assignment (Weight 20%) Case Studies (Weight 20%)	Independent Assignment (Weight 10%) Case Studies (Weight 10%) Case Studies (Weight 20%) Independent Assignment (Weight 20%) Case Studies (Weight 20%) Case Studies (Weight 20%)	Case Studies (Weight 20%) Case Studies (Weight 20%)

Evaluation Type and Assessment Weight

Type	Assessment Weight
Independent Assignment	30
Case Studies	70
Total	100

Assessment and Evaluation of Student Achievement of CLOs

SLOs that are charged on the Course	CLO	SUB CLO	Form of Assessment*			Weight	Value	Student Score
			Formative	Sumative				
				Independent Assignment	Case Studies			
SLO-7	CLO-2	SUB-CLO-1	activeness in class	10	0	10		
SLO-7	CLO-2	SUB-CLO-2	activeness in class	0	10	10		
SLO-7	CLO-3	SUB-CLO-3	Liveliness	0	20	20		
SLO-7	CLO-2	SUB-CLO-5	activeness in class and Activeness	20	20	40		
SLO-7	CLO-2	SUB-CLO-7	activeness in class	0	20	20		
				30	70	100		

Lampiran Rubrik 01 | ASSESMENT TERTULIS

Kriteria Penilaian	Bobot/Skor Penilaian				
	5	4	3	2	1/0
Konsep/ metode yang digunakan	Penjelasan konsep /metode (*) sangat lengkap dan akurat	Penjelasan konsep/metode (*) cukup jelas tetapi beberapa informasi tidak dituliskan secara lengkap.	Penjelasan konsep/metode (*) kurang jelas dan banyak informasi yang tidak dituliskan	Penjelasan yang dituliskan hampir tidak berkaitan dengan konsep/ metode (*)	Tidak memberikan konsep yang dibutuhkan
Sistematika penulisan/ pembuktian	Sistematika penulisan/ pembuktian sangat jelas dan terstruktur	Sistematika penulisan/ pembuktian cukup jelas namun ada langkah yang hilang	Sistematika penulisan/ pembuktian kurang jelas	Sistematika penulisan/ pembuktian tidak jelas	Jawaban tidak benar/ tidak ada
Interpretasi geometri/ kualitatif/ kuantitatif.	Interpretasi geometri/ kualitatif/ kuantitatif (*) tepat dan lengkap	Interpretasi geometri/ kualitatif/ kuantitatif (*) cukup lengkap/ tepat	Interpretasi geometri/ kualitatif/ kuantitatif (*) kurang lengkap/ tepat	Interpretasi geometri/ kualitatif/ kuantitatif (*) tidak lengkap/ tepat	Interpretasi geometri/ kualitatif/kuantitatif(*) tidak benar
Perhitungan/kesimpulan	Perhitungan/ kesimpulan sangat akurat/tepat dan disertai alasan yang mendasarinya	Perhitungan/ kesimpulan cukup akurat/tepat dan disertai alasan yang mendasarinya	Kesimpulan cukup tepat, namun tidak disertai alasan yang jelas	Perhitungan/ kesimpulan kurang akurat/tepat dan tidak disertai alasan yang mendasarinya	Perhitungan/kesimpulan salah

Lampiran Rubrik 02 | ASSESMENT PRESENTASI

Kriteria Penilaian	Bobot/Skor Penilaian				
	5	4	3	2	1
Penguasaan Materi	Mahasiswa sangat menguasai materi	Mahasiswa menguasai materi	Mahasiswa cukup menguasai materi	Mahasiswa kurang menguasai materi	Mahasiswa tidak menguasai materi
Sistematika Penyajian	Mahasiswa menyajikan materi presentasi dengan sangat sistematis	Mahasiswa menyajikan materi presentasi dengan sistematis	Mahasiswa menyajikan materi presentasi dengan cukup sistematis	Mahasiswa menyajikan materi presentasi dengan kurang sistematis	Mahasiswa menyajikan materi presentasi dengan tidak sistematis
Suara dan Ekspresi	Mahasiswa menjelaskan dengan suara yang sangat jelas, volume yang sangat sesuai, pengucapan istilah sangat tepat	Mahasiswa menjelaskan dengan suara yang jelas, volume yang sesuai, pengucapan istilah tepat	Mahasiswa menjelaskan dengan suara yang cukup jelas, volume yang cukup sesuai, pengucapan istilah cukup tepat	Mahasiswa menjelaskan dengan suara yang kurang jelas, volume yang kurang sesuai, pengucapan istilah kurang tepat	Mahasiswa menjelaskan dengan suara yang tidak jelas, volume yang tidak sesuai, pengucapan istilah tidak tepat
Kepercayaan Diri	Mahasiswa berbicara dengan sangat semangat, menularkan semangat dan antusiasme pada pendengar, eye contact ke semua peserta (audience)	Mahasiswa berbicara dengan semangat, menularkan semangat dan antusiasme pada pendengar, eye contact ke semua peserta (audience)	Mahasiswa berbicara dengan cukup semangat, cukup menularkan semangat dan antusiasme pada pendengar, eye contact ke semua peserta (audience)	Mahasiswa berbicara dengan kurang semangat, kurang menularkan semangat dan antusiasme pada pendengar, eye contact yang kurang ke semua peserta (audience)	Mahasiswa berbicara dengan tidak semangat, tidak dapat menularkan semangat dan antusiasme pada pendengar, tidak ada eye contact ke semua peserta (audience)
Kemampuan menjawab pertanyaan	Mahasiswa mampu menjawab semua pertanyaan dengan sangat tepat, sangat mendalam (lebih dari yang dibutuhkan), dan sangat tajam	Mahasiswa mampu menjawab semua pertanyaan dengan tepat, mendalam (lebih dari yang dibutuhkan), dan tajam	Mahasiswa mampu menjawab semua pertanyaan dengan cukup tepat, cukup mendalam, dan cukup tajam	Mahasiswa mampu menjawab semua pertanyaan dengan kurang tepat, kurang mendalam, dan kurang tajam	Mahasiswa mampu menjawab semua pertanyaan dengan tidak tepat, tidak mendalam, dan tidak tajam
Kepemimpinan presentasi kelompok	Mahasiswa sangat mampu menginisiasi, menggerakkan, mengarahkan, mengorganisir jalannya presentasi	Mahasiswa mampu menginisiasi, menggerakkan, mengarahkan, mengorganisir jalannya presentasi	Mahasiswa cukup mampu menginisiasi, menggerakkan, mengarahkan, mengorganisir jalannya presentasi	Mahasiswa kurang mampu menginisiasi, menggerakkan, mengarahkan, mengorganisir jalannya presentasi	Mahasiswa tidak mampu menginisiasi, menggerakkan, mengarahkan, mengorganisir jalannya presentasi

Lampiran Rubrik 04 | ASSESMENT DISKUSI

Kriteria Penilaian	Bobot/Skor Penilaian				
	5	4	3	2	1
Kelugasan argumen	Mahasiswa menyampaikan pendapat menggunakan bahasa yang sangat baik, sangat mudah dimengerti, intonasi suara yang sangat jelas	Mahasiswa menyampaikan pendapat menggunakan bahasa yang baik, mudah dimengerti, intonasi suara yang jelas	Mahasiswa menyampaikan pendapat menggunakan bahasa yang cukup baik, cukup mudah dimengerti, intonasi suara yang cukup jelas	Mahasiswa menyampaikan pendapat menggunakan bahasa yang kurang baik, kurang mudah dimengerti, intonasi suara yang kurang jelas	Mahasiswa menyampaikan pendapat menggunakan bahasa yang tidak baik, tidak mudah dimengerti, intonasi suara yang tidak jelas
Parsipitasi aktif	Mahasiswa sangat aktif menyampaikan pendapat/masukannya, sangat aktif memberi jawaban, dan sangat berinisiatif mencari solusi	Mahasiswa aktif menyampaikan pendapat/masukannya, aktif memberi jawaban, dan berinisiatif mencari solusi	Mahasiswa cukup aktif menyampaikan pendapat/masukannya, cukup aktif memberi jawaban, dan cukup berinisiatif mencari solusi	Mahasiswa kurang aktif menyampaikan pendapat/masukannya, kurang aktif memberi jawaban, dan kurang berinisiatif mencari solusi	Mahasiswa tidak aktif menyampaikan pendapat/masukannya, tidak aktif memberi jawaban, dan tidak berinisiatif mencari solusi
Etika dan sikap tata nilai	Mahasiswa sangat mengindahkan etika diskusi akademik secara umum	Mahasiswa mengindahkan etika diskusi akademik secara umum	Mahasiswa cukup mengindahkan etika diskusi akademik secara umum	Mahasiswa kurang mengindahkan etika diskusi akademik secara umum	Mahasiswa tidak mengindahkan etika diskusi akademik secara umum
Kepemimpinan (diskusi kelompok)	Mahasiswa sangat mampu menginisiasi, menggerakkan, mengarahkan, mengorganisir jalannya diskusi	Mahasiswa mampu menginisiasi, menggerakkan, mengarahkan, mengorganisir jalannya diskusi	Mahasiswa cukup mampu menginisiasi, menggerakkan, mengarahkan, mengorganisir jalannya diskusi	Mahasiswa kurang mampu menginisiasi, menggerakkan, mengarahkan, mengorganisir jalannya diskusi	Mahasiswa tidak mampu menginisiasi, menggerakkan, mengarahkan, mengorganisir jalannya diskusi