SEMESTER STUDY PLAN (SSP) ACTUARIAL SCIENCE ELECTIVE COURSE



DEPARTMENT OF MATHEMATICS DAN DATA SCIENCE FACULTY OF MATHEMATICS AND NATURAL SCIENCES UNIVERSITAS ANDALAS 2023/2024

1. Semester Study Plan (SSP)



SEMESTER STUDY PLAN (SSP) BACHELOR PROGRAM OF MATHEMATICS FACULTY OF MATHEMATICS AND NATURAL SCIENCES UNIVERSITAS ANDALAS

Course Name			Course Code	URL iLe	earn	Credits	Semester	Compilation Date	
ACTUARIAL SCIEN	JCE		MAT62245	https://sci.ilearn.unand.ac.id		3	6	May 8th, 2024	
Person in Charge			Study 1	Plan Creator	Head of Research Group		Head of Study Program		
			Mawanda A Efe	Almuhayar, M.Sc ndi, M.Si	Dr. Ahmad	l Iqbal Baqi	Dr. Noverina Alfiany		
Learning Outcomes	Intende	ed Lear	Learning Outcomes (ILO)						
	ILO-4	An ability to use concepts and fundamental techniques of mathematics in solving simp mathematical problems.						n solving simple	
	ILO-5	An a meth	bility to form ods that hav	nally and correct ve been studied.	ly prove a sir	nple mathen	natical stateme	ent using facts and	
	ILO-6	Have math	e ability data nematical pro	a literacy and tech oblems or other r	nnology and elevant fields	can apply th	em in solving	simple	
	ILO-7	An a com	An ability to communicate effectively especially in the area of mathematics in with diverse communities.						
	Course	Learni	earning Outcomes (CLO)						
	1	An a	bility to exp	lain actuarial con	cepts and pr	obabilities in	ı everyday life	. (ILO-4)	

	2	An ability to calculate interest and definite annuities based on events in everyday life. (ILO-								
		4, ILO-5)								
	3	An ability to create survival models and mortality tables based on events in everyday life.								
		(ILO-4, ILO-5, ILO-6)								
	4	An ability to calculate life annuities based on events in everyday life. (ILO-4, ILO-5)								
	5	An ability to calculate and simulate life insurance models and life insurance premiums								
		based on events in everyday life. (ILO-4, ILO-5, ILO-6, ILO-7)								
Course Brief Description	This co	This course applies the <i>Case-Based</i> Method (CBM), which is a learning method that uses cases as								
	mediu	m for learning development. Course participants explore, assess, synthesize, and interpret								
	inform	ation based on cases to produce an analysis and develop a solution plan.								
	In this	this course, students will learn about actuarial concepts, especially life insurance, which are								
	develo	oped from probability theory, interest theory, annuities, survival models, and mortality tables.								
	The life	e insurance model developed is an insurance model that is paid instantly at the time of death								
	and ins	surance that is paid at the end of the year of death along with the calculation of full								
	continu	uous and discrete life insurance premiums. This insurance model and premium calculation is								
	studied	d on a case basis by life insurance companies and can be applied in everyday life.								
Course Material	1. Intr	oduction to Actuarial Science and Review of Probability Theory.								
	2. Inte	rest Theory: Understanding Interest, Nominal Compound Interest, and Continuous								
	Cor	npounding.								
	3. Def	inite Annuities: Simple Annuities, Initial Annuities, Deferred Annuities, and Continuous								
	Anr	nuities.								
	4. Sur	vival Model: Survival Distribution, Death Rate, and Complete Life Expectancy.								

	5. Mortality Table: The Relationship	of the Survival Function to the Mortality Table, Selection Table,						
	Ultima Table, and Mortal Law.							
	6. Life Annuities: Continuous Life An	nnuities, Discrete Life Annuities, and <i>m</i> -times Life Annuities.						
	7. Life Insurance: Insurance Paid Inst	antly at Death and Insurance Paid at the End of the Year of						
	Death.							
	8. Life Insurance Premiums: Full Continuous Model Premiums and Full Discrete Model Premiu							
References	Main:							
	1. A. R. Effendie, Matematika Aktuaria, 3rd ed. Tangerang Selatan: Penerbit Universitas Terbuka,							
	2023.							
	2. N. L. Bowers, Jr. et al., Actuarial Mathematics, 2nd ed. Schaumburg, Illinois: Society of Actuaries,							
	1997.							
	Additional:							
	3. A. R. Effendie, Matematika Aktuaria	<i>dengan Software R.</i> Yogyakarta: Gadjah Mada University Press,						
	2018.							
Learning Media	Software:	Hardware:						
	◆ LMS UNAND	Computer / Laptop						
	(<u>https://sci.ilearn.unand.ac.id/</u>)	◆ Smartnhone						
	◆ Zoom Meeting / Microsoft	· Smartphone						
	Teams	◆ LCD Projector						
	 WhatsApp 							
Team Teaching	◆ Mawanda Almuhayar, M.Sc							

	Practitioner Lecturer
Required Courses	 MAT62151 Mathematical Statistics 1 MAT61242 Introduction to Financial Mathematics
Academic Norms	https://akademik.unand.ac.id/images/2022-03- 30%20Peraturan%20Rektor%20Nomor%207%20Tahun%202022%20Penyelenggaraan%20Pendidikan -khusus%20Bab%20II.pdf

1.1 Weekly Study Plan

Week/		Assessment	Forms of Assessment		La [Learning Materials [Reference]	Assessment		
Meeting	(2)	Indicators		Synchronous		Asynchronous			Weights	
(1)		(3)	(4)	Face-to-Face Offline (5)	Face-to-Face Online (6)	Self-Paced (7)	Collaborative (8)	Media (9)	(10)	(11)
W1 / M1	CLO 1 An ability to explain actuarial concepts and probabilities in everyday life. (ILO-4)	 Discipline in carrying out course contract Liveliness and participation in discussions 	 Liveliness and Participation 	 Explanatio n of Lecture Material Discussion and Q&A of Lecture Material [1 x 3 x 50 minutes] 		◆Self-Paced Learning [1 x 3 x 120 minutes]		 Learning Slides / Videos LMS (iLearn UNAND) 	 Assessment Rules, SSP, Syllabi, Course Contract Course overview Introduction to Actuarial Science 	

							Review of Probability Theory [1]	
W2 / M2	CLO 2 An ability to calculate interest and fixed annuities based on events in everyday life. (ILO-4, ILO- 5)	 Liveliness and participation in discussions 	 Liveliness and Participation Assignment 1 	 Explanatio n of Lecture Material Discussion and Q&A of Lecture Material [1 x 3 x 50 minutes] 	•Structured Assignmen t [1 x 3 x 120 minutes]	 Learning Slides / Videos LMS (iLearn UNAND) 	 Interest Theory Understandin g Interest Nominal Compound Interest Continuous Compoundin g	5%
W3 / M3	CLO 2 An ability to calculate interest and fixed annuities based on events in everyday life. (ILO-4, ILO- 5)	 Liveliness and participation in discussions 	 Liveliness and Participation 	 Explanatio n of Lecture Material Discussion and Q&A of Lecture Material x 3 x 50 minutes 		 Learning Slides / Videos LMS (iLearn UNAND) 	 Definite Annuities: Simple Annuity Initial Annuity Deferred Annuities [1] 	
W4 / M4	CLO 2 An ability to calculate interest and	 Keaktifan dan partisipasi 	 Liveliness and Participation 	 Explanatio n of Lecture Material 		 Learning Slides / Videos 	 Continuous Annuities [1] 	

	fixed annuities based on events in everyday life. (ILO-4, ILO- 5)	dalam diskusi • Ketepatan dalam menjelaskan materi terkait		 Discussion and Q&A of Lecture Material [1 x 3 x 50 minutes] 		 LMS (iLearn UNAND) 		
W5 / M5	CLO 3 An ability to create survival models and mortality tables based on events in everyday life. (ILO-4, ILO-5, ILO-6)	 Liveliness and participation in discussions 	 Liveliness and Participation 	 Explanatio n of Lecture Material Discussion and Q&A of Lecture Material x 3 x 50 minutes 	◆Self-Paced Learning [1 x 3 x 120 minutes]	 Learning Slides / Videos LMS (iLearn UNAND) 	 Survival Model: Survival Distribution Death Rate Complete Life Expectancy [1] 	
W6 / M6	CLO 3 An ability to create survival models and mortality tables based on events in everyday life. (ILO-4, ILO-5, ILO-6)	 Liveliness and participation in discussions Accuracy in explaining related material 	 Liveliness and Participation Assignment 2 	 Explanatio n of Lecture Material Discussion and Q&A of Lecture Material [1 x 3 x 50 minutes] 	 Structured Assignmen t [1 x 3 x 120 minutes] 	 Learning Slides / Videos LMS (iLearn UNAND) 	 Mortality Table: The Relationship of the Survival Function to the Mortality Table Selection Table Ultima Table [1] 	10%

W7 / M7	CLO 3 An ability to create survival models and mortality tables based on events in everyday life. (ILO-4, ILO-5, ILO-6)	 Liveliness and participation in discussions 	 Liveliness and Participation 	 Explanatio n of Lecture Material Discussion and Q&A of Lecture Material [1 x 3 x 50 minutes] 			◆Collaborativ e Learning [1 x 3 x 60 minutes]	 Learning Slides / Videos LMS (iLearn UNAND) 	◆ Mortal Law [1]	
W8 – W9 /-]	Midterm Exam	I				25%
W10 / M8	CLO 4 An ability to calculate life annuities based on events in everyday life. (ILO-4, ILO- 5)	 Liveliness and participation in discussions 	 Liveliness and Participation 	 Explanatio n of Lecture Material Discussion and Q&A of Lecture Material 1 x 3 x 50 minutes 				 Learning Slides / Videos LMS (iLearn UNAND) 	 Life Annuities: Continuous Life Annuities [1] 	
W11 / M9	CLO 4 An ability to calculate life annuities based on events in everyday life. (ILO-4, ILO- 5)	 Liveliness and participation in discussions 	• Liveliness and Participation	 Explanatio n of Lecture Material Discussion and Q&A of Lecture Material 				 Learning Slides / Videos LMS (iLearn UNAND) 	 Discrete Life Annuities <i>m</i>-times Life Annuities [1] 	

				[1 x 3 x 50 minutes]				
W12 / M10	CLO 5 An ability to calculate and simulate life insurance models and life insurance premiums based on events in everyday life. (ILO-4, ILO-5, ILO-6, ILO-7)	 Liveliness and participation in discussions 	 Liveliness and Participation 	 Explanatio n of Lecture Material Discussion and Q&A of Lecture Material [1 x 3 x 50 minutes] 	◆Self-Paced Learning [1 x 3 x 120 minutes]	 Learning Slides / Videos LMS (iLearn UNAND) 	 Life Insurance: Insurance Paid Instantly at the Death [1] 	
W13 / M11	CLO 5 An ability to calculate and simulate life insurance models and life insurance premiums based on events in everyday life. (ILO-4, ILO-5, ILO-6, ILO-7)	 Liveliness and participation in discussions Accuracy in explaining related material 	 Liveliness and Participation Assignment 3 	 Explanatio n of Lecture Material Discussion and Q&A of Lecture Material [1 x 3 x 50 minutes] 	 Structured Assignmen t [1 x 3 x 120 minutes] 	 Learning Slides / Videos LMS (iLearn UNAND) 	 Insurance Paid at the End of the Year of Death [1] 	5%
W14 / M12	CLO 5 An ability to calculate and simulate life insurance models and	 Liveliness and participation in discussions 	 Liveliness and Participation 	 Explanatio n of Lecture Material 		 Learning Slides / Videos LMS (iLearn 	 Life Insurance Premiums: Full Continuous 	

	life insurance premiums based on events in everyday life. (ILO-4, ILO-5, ILO-6, ILO-7)			 Discussion and Q&A of Lecture Material [1 x 3 x 50 minutes] 			UNAND)	Model Premiums [1]	
W15 / M13	CLO 5 An ability to calculate and simulate life insurance models and life insurance premiums based on events in everyday life. (ILO-4, ILO-5, ILO-6, ILO-7)	 Liveliness and participation in discussions 	• Liveliness and Participation	 Explanatio n of Lecture Material Discussion and Q&A of Lecture Material [1 x 3 x 50 minutes] 		◆Collaborativ e Learning [1 x 3 x 120 minutes]	 Learning Slides / Videos LMS (iLearn UNAND) 	 ◆ Full Discrete Model Premiums [1] 	
W16 / M14	CLO 5 An ability to calculate and simulate life insurance models and life insurance premiums based on events in everyday life. (ILO-4, ILO-5, ILO-6, ILO-7)	 Liveliness and participation in discussions 	 Liveliness and Participation 	 Explanatio n of Lecture Material Discussion and Q&A of Lecture Material x 3 x 50 minutes 		◆Collaborativ e Learning [1 x 3 x 120 minutes]	 Learning Slides / Videos LMS (iLearn UNAND) 	Case Studies of Life Insurance and Life Insurance Premiums [1]	

W17 -	Final Even / Final Deviat	EE0/
W18/-	Final Exam/ Final Project	55%

1.2 Indicators, Criteria, and Assessment Weights

- a. Assessment Weights of Each Form of Assessment:
 - 1) Assignment : 20%
 - 2) Midterm Exam : 25%
 - 3) Final Exam / Final Project : 55%
- b. Assessment Weight of Each Course Learning Outcomes (CLO):

1)	CLO 1	: 10%
2)	CLO 2	: 25%
3)	CLO 3	: 30%
4)	CLO 4	: 10%
5)	CLO 5	: 25%

Note:

The weight of the assessment, the form of assessment, and the learning outcomes must be in sync

2. Assessment Plan Table

Forms of Assessment	Assignment			Midtor	Final Exam /	Total
CLO	1	2	3	m Exam	Final Project	Weight
CLO 1 An ability to explain actuarial concepts and probabilities in everyday life. (ILO-4)				5%	5%	10%
CLO 2 An ability to calculate interest and fixed annuities based on events in everyday life. (ILO-4, ILO-5)	5%			10%	10%	25%
CLO 3 An ability to create survival models and mortality tables based on events in everyday life. (ILO-4, ILO-5, ILO-6)		10%		10%	10%	30%
CLO 4 An ability to calculate life annuities based on events in everyday life. (ILO-4, ILO-5)					10%	10%
CLO 5 An ability to calculate and simulate life insurance models and life insurance premiums based on events in everyday life. (ILO-4, ILO-5, ILO-6, ILO-7)			5%		20%	25%
Total Weight	5%	10%	5%	25%	55%	100%