SEMESTER STUDY PLAN DATA ANALYSIS (COMPULSORY COURSES)



# DEPARTMENT OF MATHEMATICS AND DATA SCIENCE FACULTY OF MATHEMATICS AND NATURAL SCIENCES UNIVERSITAS ANDALAS

2024



## SEMESTER STUDY PLAN STUDY PROGRAM BACHELOR OF MATHEMATICS FACULTY MATHEMATICS AND NATURAL SCIENCES UNIVERSITAS ANDALAS

Course Name	<u> </u>	Course Code	I-Learn	ı URL	Credits	Semester	Compilation Date		
Data Analysis		MAT61151	https://sci.ilea	<u>rn.unand.ac.i</u> l	3	1	May 12nd, 2024		
		Study Plan	Creator	Head of Research Group Head of			the study program		
Person in Charge		Prof. Dr. Ferra Dr. Maiy	Yanuar, MSc vastri	Yudiantri	Asdi, M.Sc	Dr. N	overina Alfiany		
Intended Learning	ILO Stu	ady Program							
Outcomes (ILO) and	ILO-1	Possesses a goo	Possesses a good ethics and integrity						
Performance		PI-1: An ability to explain academic ethics and integrity							
Indicators (PI)		PI-2: An ability	PI-2: An ability to act in accordance with academic ethics						
		PI-3: An ability to act in accordance with academic integrity							
	ILO-2	Possesses profour	nd knowledge o	of the basic cor	cept mathemat	ics			
		PI-1: An ability to	explain basic n	nathematical c	oncepts				
		PI-2: An ability to	provide examp	oles that are re	levant to basic r	mathematical co	oncepts		
		PI-3: An ability	to determine s	olutions to sin	nple problems u	ising basic math	nematical concepts		
	ILO-3	An ability to iden	tify, explain and	d generalize si	mple mathemat	tical problems			
		PI-1: An ability to	identify simple	e mathematica	l problems	_			
		PI-2: An ability to	explain simple	e mathematical	problems				
		PI-3: An abili	PI-3: An ability to generalize simple mathematical problems						
	ILO-4	An ability to use concept and fundamental technique of mathematics in solving simple							
		mathematical pro	mathematical problems						
		PI-1: An ab	ility to choose a	appropriate ba	sic mathematica	al concepts and	techniques in solving		
		simple mat	hematical probl	ems					

		PI-2: An ability to illustrate simple mathematical problems based on appropriate basic
		mathematical concepts and techniques
		PI-3: An ability to solve simple mathematical problems using appropriate basic mathematical
		concepts and techniques
	Course	e Learning Outcome (CLO)
	1	Students will be able to use various methods of presenting data to obtain information from data. (ILO-
		1; ILO-2: PI-1; ILO-3: PI-1, PI-2, PI-3)
	2	Students will be able to calculate the probability of an event in everyday life. (ILO-1; ILO-3: PI-1; ILO-
		4: PI-1)
	3	Students will be able to use normal distribution and <i>t</i> distribution in everyday life. (ILO-1; ILO-3: PI-
		2; ILO-4: PI-1).
	4	Students will be able to determine the distribution of sampling. (ILO-1; ILO-3: PI-3; ILO-4: PI-1, PI-2)
	5	Students will be able to use various methods of hypothesis testing and parameter estimation to draw
		conclusions about the entire population based on sample data. (ILO-1; ILO-3: PI-2; ILO-4: PI-1)
	6	Students will be able to analyze bivariate data. (ILO-1; ILO-3: PI-3; ILO-4: PI-1).
Brief Description	In this	course, the material will be provided on basic statistical methods used to describe and analyze data,
	includi	ing scope of statistics, presentation of data with tables displays, presentation of data with graphical
	display	ys, data descriptive with numerical measures, probability, random variables, discrete distributions,
	contin	uous distribution, sampling distribution, parameter estimation, hypothesis testing, and correlation and
	regress	sion analysis.
Study Materials	1. Da	ta and presentation: scope of statistics, data presentation with tables displays, presentation of data
	wi	th graphical displays, data descriptive with numerical measures.
	2. Int	roduction to probability and random variables: probability and random variables
	3. No	ormal distribution: normal distribution and t-distribution
	4. Sa	mpling distribution
	5. Inf	erence about mean values: parameter estimation, hypothesis testing

	6. Bivariate data analysis: correlation a	nd regression analysis									
References	Main:										
	a. Walpole, R. E. 1995. Introduction To	Statistics (3rd Edition). Macmillan, California.									
	b. Yozza, H dan I. Rahmi. Buku Ajar S	Yozza, H dan I. Rahmi. Buku Ajar Statistika Elementer.									
	Additional:										
	-										
Learning Media	Software:	Hardware:									
	• LMS Unand	Komputer/Laptop									
	• Zoom meeting/MS Teams/Google	LCD Projector									
	Meet										
	• Whatsapp										
Team Teaching	Prof. Dr. Ferra Yanuar, MSc										
	Dr. Maiyastri										
Assessment	Assignment, major assignment, mid-ter	m exam, final exam									
RequiredCourse	-										
Academic Norms	https://akademik.unand.ac.id/images/202	22-03-									
	30%20Peraturan%20Rektor%20Nomor%207	7%20Tahun%202022%20Penyelenggaraan%20Pendidikan-									
	khusus%20Bab%20II.pdf										

# 1.1.Weekly Lecture Plan

WEEK/	COLUMCE				LEAF [ES	RNING ACTIVI STIMATED TIM	TIES ſE]		LEARNING	
MEET	OUTCOME	Indicator	Assessment	Synchro	nous	Asyncl	nronous		MATERIALS / STUDY	Weight
(1)	(2)	(3)	(4)	Face to Face Offline (5)	Face to Face Online (6)	Independent (7)	Collaboration (8)	Media (9)	MATERIALS (10)	(11)
1-2	CLO-1: Students will be able to use various methods of presenting data to obtain information from data. (ILO-1; ILO- 2: PI-1; ILO-3: PI- 1, PI-2, PI-3)	<ul> <li>Discipline in carrying out college contracts</li> <li>Ability explains the basic mathematical concepts in presenting the data in tabular or graphical displays and numerical measures of location and variability.</li> </ul>	Assignment (5%)	<ul> <li>Studying:</li> <li>Introduction to semester study plan</li> <li>discussion the course material</li> <li>[2 x 3 x 50 minutes]</li> </ul>		Students find and read the references related to data displays in tabular or graphic. [2 x 3 x 60 minutes]	Students discuss in teams regarding data displays in tabular or graphic. [2 x 3 x 60 minutes]	LMS (ilearn UNAND)	<ul> <li>Semester study plan.</li> <li>Scope of statistics.</li> <li>Population, samples, parameters and statistics.</li> <li>Concept of data displays in tabular or graphic.</li> <li>Numerical measures data of location and variability.</li> </ul>	5%

		• Ability identifies, explains, and generalizes how to measure the location and variability of data.							
3-4	CLO-2: Students will be able to calculate the probability of an event in everyday life. (ILO-1; ILO-3: PI-1; ILO-4: PI-1)	<ul> <li>Discipline in carrying out college contracts.</li> <li>Ability identifies the sample space and event in an experiment.</li> <li>Ability calculates the probability of an event in solving several cases.</li> </ul>	Assignment (5%)	Studying: concept explanation discussion about course material [2 x 3 x 50 minutes]	Students find and read the references related to probability of an event. [2 x 3 x 60 minutes]	Students discuss in teams regarding the probability of an event in several cases. [2 x 3 x 60 minutes]	LMS (ilearn UNAND)	<ul> <li>Sample space</li> <li>Event</li> <li>Probability</li> <li>Conditional probability.</li> <li>Bayes's Theorem</li> </ul>	5%
5-7	CLO-3: Students will be able to use normal	• Discipline in carrying out college contracts.	Assignment (5%)	• Studying: concept explanation	Students find and read the references	Students discuss in teams	• ILearn (UNA ND)	<ul> <li>Normal distribution</li> <li><i>t</i> distribution</li> </ul>	5%

	distribution and t distribution in everyday life. (ILO-1; ILO-3: PI-2; ILO-4: PI- 1).	<ul> <li>Ability explains the normal distribution and <i>t</i> distribution.</li> <li>Ability selects the normal or <i>t</i> distribution to calculate the probability in solving several cases.</li> </ul>		discussion about course material [3 x 3 x 50 minutes]		related to normal distribution and t distribution [3 x 3 x 60 minutes]	regarding normal distribution and t distribution [3 x 3 x 60 minutes]	• Zoom		
8 (Midterm )	CLO-1: Students will be able to use various methods of presenting data to obtain information from data. (ILO-1; ILO- 2: PI-1; ILO-3: PI- 1, PI-2, PI-3)	• Accuracy to carry out the statistical descriptive (presenting data in tabular and graphical displays)	Midterm scores (14%)	-	-	-	-	LMS (ilearn UNAND)	• Midterm Answers	14%
	CLO-2: Students will be able to calculate the probability of an	• Accuracy to calculate the probability	Midterm scores (14%)	-	-	-	-	ILearn (UNAND)	• Midterm Answers	14%

	event in everyday life. (ILO-1; ILO-3: PI-1; ILO-4: PI-1)	of an event.								
	CLO-3: Students will be able to use normal distribution and t distribution in everyday life. (ILO-1; ILO-3: PI-2; ILO-4: PI- 1).	• Accuracy to perform the normal distribution and <i>t</i> distribution in several cases.	Midterm value (7%)	-	-	-	-	ILearn (UNAND)	• Midterm Answers	7%
9	CLO-4: Students will be able to determine the sampling distribution. (ILO- 1; ILO-3: PI-3; ILO-4: PI-1, PI-2	<ul> <li>Discipline in carrying out college contracts.</li> <li>Ability to generalize the inference about the population from sample information</li> <li>Ability to choose and illustrate the sampling distribution in solving several cases.</li> </ul>	Major Assignment (5%)	Studying: concept explanation discussion about course material Review and discussion of project design alternatives and evaluation results Discussion of the project data		<ul> <li>Students         <ul> <li>find and</li> <li>read the</li> <li>references</li> <li>related to</li> <li>sampling</li> <li>distribution.</li> </ul> </li> <li>Students         <ul> <li>propose</li> <li>alternative</li> <li>project</li> <li>designs</li> <li>along with</li> <li>selected</li> <li>case data</li> <li>and project</li> <li>implementa</li> </ul> </li> </ul>	Students discuss in teams regarding sampling distribution. [1 x 3 x 60 minutes]	LMS (ilearn UNAND)	<ul> <li>Random sampling</li> <li>Sampling distribution of means</li> <li>Sampling distribution of central limit theorem</li> <li>Quantile and probability plots</li> </ul>	5%

				collection process [1 x 3 x 50 minutes]		tion schedule. [1 x 3 x 60 minutes]				
10-12	CLO-5: Students will be able to use various methods of hypothesis testing and parameter estimation to draw conclusions about the entire population based on sample data. (ILO-1; ILO-3: PI- 2; ILO-4: PI-1)	<ul> <li>Discipline in carrying out college contracts.</li> <li>Ability to explain the hypothesis test in drawing a conclusion based on the sample data.</li> <li>Ability to choose the hypothesis test methods for parameter of (mean if standard deviation is known or unknown, proportion, and</li> </ul>	Major Assignment (5%)	<ul> <li>Studying: concept explanation discussion about course material Review and discussion of project design alternatives and evaluation results</li> <li>x 3 x 50 minutes]</li> </ul>	Discussi on of the best design alternati ves between lecturers and students [3 x 3 x 50 minutes]	<ul> <li>Students find and read the references related to hypothesis test.</li> <li>Students carry out final design activities based on the results of team discussions</li> <li>[3 x 3 x 60 minutes]</li> </ul>	<ul> <li>Students discuss in teams regarding hypothesis test.</li> <li>Students discuss in teams to determine the best design alternative</li> <li>[3 x 3 x 60 minutes]</li> </ul>	• ILearn (UNAND) • Zoom	<ul> <li>Statistical hypothesis</li> <li>Decision making process using probability value and critical value</li> <li>Single sample: tests concerning mean, proportion, and variance.</li> <li>Two samples: tests concerning mean, proportion, and variance.</li> </ul>	5%

		variance) for one and two populations.								
13-15	CLO-6: Students will be able to analyze bivariate data. (ILO-1; ILO-3: PI- 3; ILO-4: PI-1).	<ul> <li>Discipline in carrying out college contracts.</li> <li>Ability to generalize and choose the formula in analyzing bivariate data of simple linear regression and correlation</li> <li>Student accuracy in presenting the final mini research report and answering questions</li> </ul>	Major Assignment (5%)	Studying: concept explanation discussion about course material Review and discussion of project design alternatives and evaluation results Individual presentation [3 x 3 x 50 minutes]		<ul> <li>Students find and read the references related to bivariate.</li> <li>Students revise the written mini research progress report</li> <li>[ 3 x 3 x 60 minutes]</li> </ul>	<ul> <li>Students discuss in teams regarding bivariate data.</li> <li>Students discuss in teams to improve the mini research progress report based on input during presentations and discussions</li> <li>[ 3 x 3 x 60 minutes</li> </ul>	• ILearn (UNA ND)	<ul> <li>Linear regression</li> <li>Least Squares methods</li> <li>Correlation</li> <li>Presentation materials Mini research final report</li> </ul>	5%
16 (Final exam)	CLO-4: Students will be able to determine the distribution of sampling. (ILO-1;	• Accuracy in determining the sampling distribution.	Final exam scores (10.5%)	-	-	-	-	LMS (ilearn UNAND)	• Final exam Answers	10.5%

]	ILO-3: PI-3; ILO-4: PI-1, PI-2)									
	CLO-5: Students will be able to use various methods of hypothesis testing and parameter estimation to draw conclusions about the entire population based on sample data. (ILO-1; ILO-3: PI- 2; ILO-4: PI-1)	• Accuracy in drawing conclusion based on the hypothesis test using the sampe data.	Final exam scores (14.7%)	-	-	-	-	(ILearn UNAND )	• Final exam Answers	14.7%
	CLO-6: Students will be able to analyze bivariate data. (ILO-1; ILO- 3: PI-3; ILO-4: PI- 1).	• Accuracy in analyzing the bivariate data	Final exam score (9.8%)	-	-	-	-	(ILearn UNAND )	• Final exam Answers	9.8%
									Total Weight	100%

#### **1.2.Indicators, Criteria and Assessment Weights**

1. Assessment Weight:

NO	FORM OF ASSESSMENT	WEIGHT (%)
1	Assignment/Homework	15%
2	Major Assignment	15%
3	Mid-term exam	35 %
4	Final exam	35%
	TOTAL	100

- 2. Assessment Weight for each Course Learning Outcome
  - CLO 1: 19%
  - CLO 2: 19%
  - CLO 3: 12%
  - CLO 4: 15.5%
  - CLO 5: 19.7%
  - CLO 6: 14.8%

## **1.3.Assessment Plan Table**

Form	n of assessment	Final	Mid-term	Assignment	Major	Total
Cour	se Learning Outcomes (CLO)	exam	exam	/ Homework	Assignment	TOLAT
1	Students will be able to use various methods of presenting data to		14%	5%		19%
	obtain information from data. (ILO-1; ILO-2: PI-1; ILO-3: PI-1, PI-					
	2, PI-3)					
2	Students will be able to calculate the probability of an event in		14%	5%		19%
	everyday life. (ILO-1; ILO-3: PI-1; ILO-4: PI-1)					
3	Students will be able to use normal distribution and $t$ distribution		7%	5%		12%
	in everyday life. (ILO-1; ILO-3: PI-2; ILO-4: PI-1).					
4	Students will be able to determine the distribution of sampling.	10,5%			5%	15.5%
	(ILO-1; ILO-3: PI-3; ILO-4: PI-1, PI-2).					
5	Students will be able to use various methods of hypothesis testing	14,7%			5%	19.7%
	and parameter estimation to draw conclusions about the entire					
	population based on sample data. (ILO-1; ILO-3: PI-2; ILO-4: PI-1)					

6	Students will be able to analyze bivariate data. (ILO-1; ILO-3: PI-3;	9.8%			5%	14.8%
	ILO-4: PI-1).					
Total		35%	35%	15%	15%	100%

#### Matrix of CLO and ILO

		ILO																														
CLO	1			2			3			4			5			6				7			8				9					
	PI		PI			PI		PI			PI			PI					PI			PI				PI						
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	4	1	2	3	4	5	1	2	3	1	2	3	4	1	2	3	4
1	$\checkmark$			$\checkmark$			$\checkmark$	$\checkmark$	$\checkmark$																							
2							$\checkmark$			$\checkmark$																						
3								$\checkmark$		$\checkmark$																						
4									$\checkmark$	$\checkmark$	$\checkmark$																					
5								$\checkmark$		$\checkmark$																						
6									$\checkmark$	$\checkmark$																						