SEMESTER STUDY PLAN
TOPIC IN STATISTICS 1
(ELECTIVE COURSES)

DEPARTMENT OF MATHEMATICS AND DATA SCIENCE

FACULTY OF MATHEMATICS AND NATURAL SCIENCES

UNIVERSITAS ANDALAS

2024

	SEMESTER STUDY PLAN **STUDY PROGRAM: MASTER OF MATHEMATICS** **FACULTY OF MATHEMATICS AND NATURAL SCIENCES** **UNIVERSITAS ANDALAS**

Course Name	Course Code	*I-Learn* URL	Credits	Semester	Compilation Date
Topic in Statistics 1	**MAT82234**	**http://sci.ilearn.unand.ac.id**	**3**	**2**	**May 3rd, 2024**

Person in Charge	Study Plan Creator	Head of Research Group	Head of the Study Pprogram
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Intended Learning Outcomes (ILO) and Performance Indicators (PI)	**Intended Learning Outcome (ILO)**	
	ILO-2	Mastering mathematical concepts and applications (real analysis, advanced linear algebra, and statistics) in solving complex mathematical problems. PI-1. An ability to explain mathematical concepts (Real Analysis, Advanced Linear Algebra, and Statistics). PI-2. An ability to identify complex mathematical problems. PI-3. An ability to solve complex mathematical problems.
	ILO-3	Comprehensive mastery of one or several theories for development in the fields of analysis, algebra, applied mathematics, statistics and combinatorial mathematics. PI-1. An ability to identify theories used in related mathematical problems. PI-2. An ability to apply theories for advancement in related fields (advanced theory). PI-3. An ability to use advanced theory to solve related mathematical problems.
	ILO-4	Mastering scientific techniques and developing them in solving research problems through multidisciplinary or interdisciplinary approaches. PI-1. An ability to apply mathematical techniques in research problem-solving. PI-2. An ability to analyze research problems. PI-3. An ability to formulate theorems/models and prove their validity.

		PI-4. An ability to use various mathematical software to solve complex mathematical problems.
	ILO-5	Able to work and conduct research in the field of mathematics and related fields of science by developing the latest issues independently or collaboratively and communicating them academically PI-1. Capable of formally and correctly proving mathematical statements. PI-2. An ability to employ relevant techniques for conducting research. PI-3. Capable of communicating research findings in an academic manner.
	Course Learning Outcome (CLO)	
	1	An ability to explain basic concepts in statistics and modeling in statistics (ILO-2: PI-1, PI-2)
	2	An ability to explain the concept of Bayesian analysis and use Bayesian inference on data distribution (discrete and continuous) (ILO-2: PI-3)
	3	An ability to use hybridization of the Bayesian method with several other statistical methods (ILO-3: PI-1, PI-2, PI-3).
	4	An ability to construct simple algorithms for modeling using Bayesian methods (ILO-4: PI-1, PI-2).
	5	An ability to use software and create algorithms to apply Bayesian and hybridization methods (ILO-4: PI-3).
	6	An ability to reason intuitively and analytically and are able to express the results of their reasoning in writing, systematically and rigorously, both individually and in groups (ILO-5: PI-1, PI-2, PI-3).
Brief Description	In this course, material is provided on basic concepts in Bayesian inference, Bayesian inference on several distributions of discrete and continuous random variables. To increase understanding and provide simple research experience to students, this lecture is also equipped with an assignment, namely criticizing articles written related to Bayesian methods and expressing them individually..	

<table>
<tr><td>Study Materials</td><td colspan="2">1. Parameter estimation and hypothesis testing.
2. Basic concepts in Bayesian analysis.
3. Bayesian inference on the distribution of discrete random variables.
4. Bayesian inference on the distribution of continuous random variables.
5. Basic concepts for using the R application and/or WinBugs in Bayesian analysis
6. Reviewing articles related to Bayesian methods.</td></tr>
<tr><td rowspan="3">References</td><td colspan="2">Main:</td></tr>
<tr><td colspan="2">Bain, L. J. and Engelhardt, M. 2000. Introduction to Probability and Mathematical Statistics, Second Edition. Duxbury Press, California.
Bolstad, W. M. and Curran, J. M. 2016. Introduction to Bayesian Statistics , third edition. John Wiley & Sons, New Jersey.</td></tr>
<tr><td colspan="2">Supporting :
Ntzoufras, I. 2009. Bayesian Modeling Using WinBUGS. John Wiley & Sons, Inc: Ney Jersey.</td></tr>
<tr><td>Learning Media</td><td>Software:
• LMS Unand (http://sci.ilearn.unand.ac.id/)
• Zoom meeting
• Whatsapp
• Software (SPSS, R dan WinBUGS)</td><td>Hardware:
Komputer/Laptop dan LCD Projector</td></tr>
<tr><td>Team Teaching</td><td colspan="2">Prof. Dr. Ferra Yanuar, M.Sc
Dr. Dodi Devianto</td></tr>
<tr><td>Assessment</td><td colspan="2">Assignment, participation, midterm exam, final exam</td></tr>
<tr><td>Required courses</td><td colspan="2">MAT81131 Probability Theory</td></tr>
<tr><td>Academic Norms</td><td colspan="2">(https://akademik.unand.ac.id/images/2022-03-30%20Peraturan%20Rektor%20Nomor%207%20Tahun%202022%20Penyelenggaraan%20Pendidikan-khusus%20Bab%20II.pdf)</td></tr>
</table>

Weekly Study Plan

WEEK (1)	COURSE OUTCOME (2)	ASSESSMENT INDICATORS (3)	FORM OF ASSESSMENT (4)	LEARNING ACTIVITIES [Estimated Time]					LEARNING MATERIALS [Reference] (10)	WEIGHT (11)
				Synchronous		Asynchronous		MEDIA (9)		
				Face to Face Offline (5)	Face to Face Online (6)	Independent (7)	Collaborative (8)			
1-2	CLO 1 An ability to explain basic concepts in statistics and modeling in statistics (ILO-2: PI-1, PI-2).	Discipline in implementing the college contract Accuracy in understanding related material	Participation (2.5%) Midterm exam (10%) Assignment (5%)	Class: - introduction of semester learning plan - discussion about		o Students look for references and study lecture material: basic concepts in statistics and		LMS (ilearn UNAND)	Basic concepts in statistics and modeling in statistics	17.5%

				course material [2 x 3 x 50 minutes]		modeling in statistics [2 x 3 x 120] minutes				
3-4	CLO 2 An ability to explain the concept of Bayesian analysis and use Bayesian inference on data distribution (discrete and continuous) (ILO-2: PI-3).	• Accuracy in understanding related material • Accuracy in answering assignment questions • Neatness of task execution ● Originality of task results	Midterm exam (10%) Assignment (5%)	Class: - explanation of concepts - discussion about course materials [2 x 3 x 50 minutes]		Students look for references and study material [2 x 3 x 60 minutes]	Students' s discussion in groups [2x3x60] minutes	LMS (ilearn UNAND)	Material Alternatives: ● Bayesian inference on discrete (Poisson) distributions ● Bayesian inference on continuous (Exponential) distributions.	15%
5-7	CLO 3 An ability to use hybridization of the Bayesian method with several other statistical methods (ILO-3: PI-1,PI-2, PI-3).	• Accuracy in understanding related material • Accuracy in answering assignment questions • Neatness of task execution ● Originality of task results	Midterm exam (10%) Participation (2.5%) Assignment (5%)	- Quiz, - discussion about course materials [3 x 3 x 50 minutes]		Students look for references and study material: ● Bayesian Self Error Loss Function (SELF) method. ● Bayesian Linux Loss Function Method	Students' s discussion in groups [3x3x60] minutes		Material alternatives: ● Bayesian Self Error Loss Function (SELF) method. ● Bayesian Linux Loss Function Method	17.5%

						● Cox professional hazard regression method with Weibull distribution. [3 x 3 x 60 minutes]				
MIDTERM EXAM										
8-10	CLO 4 An ability to construct simple algorithms for modeling using Bayesian methods (ILO-4: PI-1, PI-2).	• Accuracy in understanding related material • Accuracy in answering assignment questions • Neatness of task execution ● Originality of task results	Final exam (10%) Assignment (5%)	Class: - Explanation the concepts, - discussion about course materials [4 x 3 x 50 minutes]		Students look for references and study lecture material [4 x 3 x 60 minutes]	Students' s discussion in groups [4x3x60] minute s	● LMS	● Coding in Bayesian method ● Practice WinBugs ● Bayesian Inference with WinBugs	15%

11-14	CLO 5 An ability to use software and create algorithms to apply Bayesian and hybridization methods (ILO-4: PI-3). CLO 6 An ability to reason intuitively and analytically and are able to express the results of their reasoning in writing, systematically and rigorously, both individually and in groups .(ILO-5: PI-1, PI-2, PI-3) .	• Accuracy in understanding related material • Accuracy in answering assignment questions • Neatness of task execution ● Originality of task results	Final exam (10%+10%) Participation (2.5%+2,5%) Assignment (5%+5%)	Class: - Explanation the concepts, - discussion about course materials [4 x 3 x 50 minutes]		Students look for references and study lecture material [4 x 3 x 60 minutes]	Students' s discussion in groups [4x3x60] minute s	● LMS ● Zoom	Alternative topics: ● Bayesian Self Error Loss Function (SELF) method. ● Bayesian Linux Loss Function Method	35%
FINAL EXAM										

Indicators, Criteria and Proportions of Assessment

1. Assessment weight for each Assessment

NO	FORM OF ASSESSMENT	PROPORTION (%)
1	Assignment	30
2	Participation	10
3	Midterm exam	30
4	Final exam	30
TOTAL		**100**

2. Assessment weight for Intended Learning Outcome
   - CLO-1: 17.5 %
   - CLO-2: 15%
   - CLO-3: 17.5 %
   - CLO-4: 15 %
   - CLO-5: 17.5 %
   - CLO-6: 17.5 %

Assessment Plan Table

No	CLO	Assessment				Weight (%)
		Mid-term exam (%)	Final Exam (%)	Participation (%)	Assignments (%)	
1	1. An ability to explain basic concepts in statistics and modeling in statistics (ILO-2: PI-1, PI-2)	10		2.5	5	17.5
2	2. An ability to explain the concept of Bayesian analysis and use Bayesian inference on data distribution (discrete and continuous) (ILO-2: PI-3)	10			5	15
3	3. An ability to use hybridization of the Bayesian method with several other statistical methods (ILO-3: PI-1, PI-2, PI-3).	10		2.5	5	17.5
4	4. An ability to construct simple algorithms for modeling using the Bayesian method (ILO-4: PI-1, PI-2).		10		5	15
5	5. An ability to use software and create algorithms to apply Bayesian and hybridization methods (ILO-4: PI-3).		10	2.5	5	17.5

6	6. An ability to reason intuitively and analytically and are able to express the results of their reasoning in writing, systematically and rigorously, both individually and in groups.(ILO-5: PI-1, PI-2, PI-3)		10	2.5	5	17.5
	Total	30	30	10	30	100

Matrix of CLO and ILO

CLO	**ILO**																	
	1		**2**			**3**			**4**				**5**			**6**		
	PI		**PI**			**PI**			**PI**				**PI**			**PI**		
	1	**2**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**1**	**2**	**3**

1			✓	✓	✓													
2						✓	✓	✓										
3						✓	✓	✓										
4									✓	✓	✓	✓						
5													✓	✓	✓			