SEMESTER STUDY PLAN

CAPITA SELECTA ON STATISTICS II / MAT 61255

(ELECTIVE COURSE)

DEPARTMENT OF MATHEMATICS AND DATA SCIENCE

FACULTY OF MATHEMATICS AND NATURAL SCIENCES

UNIVERSITAS ANDALAS

2024

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

Course Name	Course Code	URL *I-Learn*	Credits	Semester	Compilation Date
Capita Selecta on Statistics II	MAT 61255	https://sci.ilearn.unand.ac.id	3	6	5 May 2024

Person In Charge	Study Plan Creator	Head of Research Group	Head of Study Program
	Dr. Dodi Devianto, M.Sc Prof. Dr. Ferra Yanuar, M.Sc	Ir. Yudiantri Asdi, M.Sc	Dr. Noverina Alfiany

Intended Learning Outcomes (ILO) and Performance Indicator (PI)		
	Intended Learning Outcomes	
	ILO-1	Possesses a good ethics and integrity 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 profound knowledge of the basic concept mathematics PI-1: An ability to explain the basic concept mathematics PI-3: An ability to determine solution of the simple problems using the basi concept mathematics
	ILO-3	An ability to identify, explain and generalize simple mathematical problems PI-1: An ability to identify simple mathematical problems PI-2: An ability to explain simple mathematical problems 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 problems PI-1: An ability to choose appropriate basic mathematical concepts and techniques in solving simple mathematical problems PI-3: An ability to solve simple mathematical problems using the proper concept and mathematical fundamental techniques
	ILO-5	An ability formally and correctly proves a simple mathematical statements using facts and methods that have been studied PI-1: An ability to identify the formal structures and analogous forms in mathematics PI-2: An ability to use fact and apply methods in proving simple mathematical statement PI-3: An ability to present simple mathematical statement proof rigorously (sequentially and conscientious) PI-4: An ability to conclude or interpret result of the proving simple mathematical statement
	ILO-6	An ability to communicate effectively especially in the area of mathematics in with diverse communities PI-1: An ability to convey ideas or study results orally, especially in the field of mathematics PI-2: An ability to present ideas or study results in writing, especially in the field of mathematics

		PI-3: An ability to respond to feedback given
	Course Learning Outcomes	
	1	Students are able to explain the concept of statistical modeling (ILO-4, ILO-5).
	2	Students are able to explain the concept of Bayesian inference used in statistical modeling (ILO-4, ILO-5).
	3	Students are able to explain the concept of Bayesian inference with multivariate statistical models (ILO-5, ILO-6).
	4	Students are able to construct Bayesian mixed models with multivariate statistical models and algorithms for data processing (ILO-5, ILO-6).
	5	Students are able to reason clearly and analytically and are able to transmit the results of their reasoning in writing, systematically and thoroughly both individually and in groups in the form of scientific reports (ILO-6).
Brief Description	This course applies Case Based Method (CBM), a learning method that uses cases as a medium for learning development. Students carry out exploration, assessment, interpretation, synthesis and case-based information to produce an analysis and develop a solution plan using a Bayesian inference approach. This CBM-based learning provides knowledge about the concept of mathematical models based on the concept of Bayesian inference with multivariate statistical modeling and its applications.	
Course Materials	1. Introduction to conditional probability and the concept of Bayesian probability. 2. Parameter estimation in the concept of Bayesian inference in multivariate statistical models. 3. The case of Bayesian inference on selected models (survival analysis). 4. The case of Bayesian inference on selected models (small area estimation). 5. Review of selected Bayesian inference model article writing.	
References	**Main:** 1. A. Gelman, J.B. Carlin, H.S. Stern, D.B. Dunson, and A. Vehtari. Bayesian Data Analysis. Chapmann Hall/CRC, 3rd Edition, 2013. 2. P.D. Hoff. A First Course in Bayesian Statistical Methods. Springer, 2009th Edition, 2009. 3. P. M. Lee. Bayesian Statistics: An Introduction. Wiley, 4th Edition, 2012. **Additional:** 1. K. Matsuura. Bayesian Modeling with Stan, R and Phyton. Springer 1st Edition, 2023. 2. I. Ntzoufras. Bayesian Modeling Using WinBUGS. John Wiley & Sons Inc, 1st Edition. 2009. 3. Y. Lio, D-G. Chen, H. Keung, T. Ng, and T-R. Tsai. Bayesian Inference and Computation in Reliability and Survival Analysis. Springer, 1st Edition, 2022.	
Learning Media	**Software:**	**Hardware:**

	• LMS Unand (http://fmipa.ilearn.unand.ac.id/) • Zoom meeting	• Computer/Laptop • Smartphone • Whatsapp Group
Team Teaching	1. Dr. Dodi Devianto, M.Sc	
Assessment	Homework (assignment), Mid-Term exam, Final exam, Project	
Required courses	MAT 61151 Data Analysis MAT 62152 Mathematical Statistics I	
Academic Norms	https://akademik.unand.ac.id/images/2022-03-30%20Peraturan%20Rektor%20Nomor%207%20Tahun%202022%20Penyelenggaraan%20Pendidikan-khusus%20Bab%20II.pdf	

Weekly Study Plan

Week / Meet (1)	Course Outcomes (2)	Indicator (3)	Assessment (4)	Activities/Forms of Learning [Time estimated]					Subject, references (10)	Weight (11)
				Synchronous*		Asynchronous**		Media (9)		
				Face to face Offline	Face to face Online	Individual (7)	Collabo-ration (8)			

				(5)	(6)					
1-2	CLO-1 Students are able to explain the concept of statistical modeling (ILO-4, ILO-5).	- Discipline in carrying out the college contract - Precision in understand related material	Mid-Term Material (10%) Independen t Task (5%)	Studying: - Introduction to study plan - Lectures, discussions and questions and answers - Course material [2 x 3 x 50] minutes		- Student look for references and learn material about statistical modeling concepts. - Independent work [2 x 3 x 120] minutes		LMS (ilearn UNAND)	- Introduction to College (Assessment Rules, RPS, Syllabus, College Contract). - Basic concepts of statistical modeling.	10%
3-7	CLO-2 Students are able to explain the concept of Bayesian inference used in statistical modeling (ILO-4, ILO-5).	- Precision understand related material - Precision in answering questions and assignments - Neatness processing Task - Originality task results	Mid-Term Material (10%) Homework (5%)	Studying: - Explanation draft - Discussion and question and answer - Course material [5 x 3 x 50] minutes		- Student look for references and learn Bayesian inference materials. - Independent work [5 x 3 x 60] minutes	- Student discuss in group [5 x 3 x 60] minutes	LMS (ilearn UNAND)	- Basic concepts of Bayesian inference. - Bayesian inference in statistical modeling	10%
8	MID-TERM EXAM									
9-10	CLO-3 Students are able to explain the concept of Bayesian inference with multivariate statistical models (ILO-5, ILO-6).	- Precision understand related material - Precision in answering questions and assignments - Neatness processing Task - Originality task results	Aktivity (5%) Final Exam Material (10%) Homework (10%)	Studying: - Explanation draft - Discussion and question and answer - Course material [2 x 3 x 50] minutes		- Student look for references and learn Bayesian inference material with multivariate statistical models. - Independent work [2 x 3 x 60] minutes	- Student discuss in group [2 x 3 x 60] minutes	LMS (ilearn UNAND)	- Estimation of Bayesian inference model parameters - Bayesian inference concept with multivariate statistical models	40%

11-12	CLO-4 Students are able to construct Bayesian mixed models with multivariate statistical models and algorithms for data processing (ILO-5, ILO-6). .	- Precision understand related material - Precision In answering about assignments - Neatness processing Task - Originality task results	Final Exam Material (5%) Homework (10%)	Studying: - Explanation draft - Discussion and question and answer - Course material [2 x 3 x 50] minutes		- Student look for references and learn Lecture material on Bayesian mixed models with multivariate statistical models and algorithms for data processing. - Independent work [2 x 3 x 60] minutes	- Student deep discussion group [2 x 3 x 60] minutes	LMS (ilearn UNAND)	- Bayesian mixed models with multivariate statistical models - Bayesian inference algorithm and data processing	15%
13-14	CLO- 5 Students are able to reason clearly and analytically and are able to transmit the results of their reasoning in writing, systematically and thoroughly both individually and in groups in the form of scientific reports (ILO-6).	- Accuracy of understanding related material - Precision In answering questions task - Neatness processing task - Originality task results	Final Exam Material (10%) Activity (5%) Homework (15%)	Practice: - Discussion and Question and answer - Presentation group - Course material [2 x 3 x 50] minutes		- Student look for references and learn course material. - Independent work [2 x 3 x 60] minutes	- Student discuss in Group [2 x 3 x 60] minutes	LMS (ilearn UNAND)	- Survival and small are estimation models. -Case Based Method scientific writing.	20%
16	**FINAL EXAM**									

1 credit = 50 minutes face-to-face meeting, 60 minutes structured study, 60 minutes independent study
Each meeting duration is 3 credits = 3×50 minutes

Indicators, Criteria, and Assessment Weights

1. Assessment weight for each Assessment

NO	Assessment	Weight (%)
1	Mid-Term Exam	20
2	Final Exam	20
3	Assignment (Homework)	10
4	Project	50
TOTAL		**100**

2. Assessment weight for Intended Learning Outcome

CLO-1 : 10%
CLO- 2 : 10%
CLO-3 : 40 %
CLO-4 : 15 %
CLO-5 : 20%

Assessment Plan Table:

CLO	Assessment				Weight (%)
	Mid-Term Exam (%)	Final Exam (%)	Project (%)	Homework (%)	
1. Students are able to explain the concept of statistical modeling (ILO-4, ILO-5).	5	3	2	5	15
2. Students are able to explain the concept of Bayesian inference used in statistical modeling (ILO-4, ILO-5).		4	1	5	10
3. Students are able to explain the concept of Bayesian inference with multivariate statistical models (ILO-5, ILO-6).	15	8	7	10	40
4. Students are able to construct Bayesian mixed models with multivariate statistical models and algorithms for data processing (ILO-5, ILO-6).		5		10	15
5. Students are able to reason clearly and analytically and are able to transmit the results of their reasoning in writing, systematically and thoroughly both individually and in groups in the form of scientific reports (ILO-6).				20	20
Total Weight	20	20	10	50	100