Module Description/Course Syllabi

Study Programme: Bachelor of Mathematics
Faculty of Mathematics and Natural Sciences
Universitas Andalas

1. *Course number and name*

MAT 61253 Capita Selecta on Statistics II

2. *Credits and contact hours/Number of ECTS credits allocated*

3 SKS / 4,53 ECTS

3. *Instructors and course coordinator*

1. Dr. Dodi Devianto, M.Sc
2. Prof. Dr. Ferra Yanuar, M.Sc

4. *Text book, title, author, and year*

1. A. Gelman, J.B. Carlin, H.S. Stern, D.B. Dunson, and A. Vehtari. Bayesian Data Analysis. Chapmann Hall/CRC, 3rd Editian, 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.

5. *Recommended reading and other learning resources/tools*

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.

6. *Specific course information*

A. Brief description of the content of the course (catalog 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.
B. Prerequisites or co-requisites
MAT 61151 Data Analysis MAT 62152 Mathematical Statistics I
C. Indicate whether a required or elective course in the program
Elective
D. Level of course unit (according to EQF: first cycle Bachelor, second cycle Master)
First Cycle Bachelor
E. Year of study when the course unit is delivered (if applicable)
4^{th} year
F. Semester when the course unit is delivered
Even Semester
G. Mode of delivery (face-to-face, distance learning)
Face to face
7. *Intended Learning Outcomes*

ILO-1: Possesses a good ethics and integrity
PI-2: Able to act in accordance with academic ethics
PI-3: Able 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 basic concept mathematics
ILO-3: An ability to identify, explain and generalise simple mathematical
PI-1: An ability to identify simple mathematical problems
PI-2: An ability to explain simple mathematical problems
PI-3: An ability to generalise 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 illustrate simple mathematical problems based on appropriate basic mathematical concepts and techniques
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 analogy 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: Able to convey ideas or study results orally, especially in the field of mathematics
PI-2: Able to present ideas or study results in writing, especially in the field of mathematics
PI-3: Able to respond to feedback given

8. *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).
9. *Brief list of topics to be covered*
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.
10. Learning and teaching methods
Directed Learning, Teacher Center Learning, Presentation, Group Discussion, Project facilitator.
11. Language of instruction
Indonesia and English
12. Assessment methods and criteria
Summative Assessment : 1. Mid-term exam: 20% 2. Final exam: 20% 3. Assignment (home work): 10% 4. Project : 50%