Module Description/Course Syllabi

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

1. *Course number and name*

MAT62257 Multivariate Analysis

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

3 sks / 4,53 ECTS

3. *Instructors and course coordinator*

1. Dr. Maiyastri; 2. Dr Rahmat Syahni

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

1. Johnson, R.A and D.W. Winchern. 2014 Applied Multivariate Statistical Analysis 6th ed. Pearson Education Limited, London UK
2. Hair Jr, J.F., W.C. Black, B.J. Babin, and R.A. Anderson. 2019. Multivariate Data Analysis 8th ed. Cengage, UK

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

1. Cox, T.F. and M.A.A. Cox. 2001. Multidimensional Scaling 2nd ed. Chapman and Hall, USA
2. Greenacre, MJ. 2017. Correspondence Analysis in Practice 3rd ed. Chapman and Hall/CRC, USA
3. Jolliffe, IT. 2002. Principal Component Analysis 2nd ed. Springer-Verlag, New York
4. Related scientific articles
5. Data Repository

6. ***Specific course information***
A. Brief description of the content of the course (catalog description)
This course discusses various statistical techniques used to analyze multivariate data. Starting with an introduction to the scope of multivariate analysis, the techniques discussed in this course are Graphical Presentation of multivariate Data, Hypothesis Testing on the difference of the mean vector and variance matrix, Cluster Analysis, Principal Component Analysis, Factor Analysis, Canonical Correlation Analysis, Discriminant Analysis, Biplot Analysis, Correspondence Analysis, and Multiple Dimensional Scaling. For every method, a theoretical overview, the stages of the analysis, and the interpretation of the results will be provided. The techniques discussed usually involve complex calculations, making it difficult to perform these analysis techniques manually. Therefore, this course will also discuss the use of statistical software in analyzing multivariate data in a practicum which is part of the student's learning process. This course is conducted in a blended manner with a project-based approach. At the end of the lecture, in groups, students are assigned in groups and asked to solve cases using previously learned techniques and write them in the form of scientific articles that will be submitted to scientific journals and presented. Students can use newer methods that are a development of the techniques learned in this course
B. Prerequisites or co-requisites
MAT61151 Data Analysis
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)

3rd 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-2: Possesses profound knowledge of the basic concept of mathematics PI-1: An ability to explain the basic concept of mathematics
ILO-4: An ability to use concepts and fundamental techniques of mathematics in solving simple mathematical problems PI-3: An ability to solve simple mathematical problems using the proper concept and mathematical fundamental techniques
ILO-6: Have the ability to data literacy and technology and can apply them in solving simple mathematical problems or other relevant fields PI-1: An ability to identify the right data and technology to solve simple mathematical problems or other fields PI-2: An ability to use data and technology and apply them to solve simple mathematical statements or other areas PI-3: An ability to process data using available technology in simple mathematical problems or other fields PI-4: An ability to conclude and interpret data processing results for simple mathematical problems or other fields PI-5: An ability to design an algorithm to solve simple mathematical problems or other fields
ILO-7: 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
ILO-8: An ability to work in a team PI-1: Able to actively participate in a team with full responsibility PI-2: Able to respond well to any feedback within the team PI-3: Able to complete tasks according to the set schedule PI-4: Able to adapt in a team
8. ***Course Learning Outcomes***
1. Students have an ability to explain the scope of multivariate analysis including the form of multivariate data, problems addressed by multivariate analysis, and identify appropriate methods to analyze the problem of multivariate data. (ILO-2 PI-1)
2. Students have an ability to graphically present multivariate data according to data type and interpret the result (ILO-2 PI-1; ILO-6 PI-1; ILO-6 PI-2; ILO-6 PI-3; ILO-6 PI-4; ILO-6 PI-5)
3. Students have an ability to perform hypothesis testing on the difference of the mean value vector and variance matrix of multivariate data (CP-4 PI-3)
4. Students have an ability to explain the theoretical concepts of various methods of multivariate data analysis (ILO-2 PI-1)
5. Students have an ability to use appropriate methods of multivariate data analysis for various type of data and the problem to be answered; and interpret the results (ILO-6 PI-1; ILO-6 PI-2; ILO-6 PI-3; ILO-6 PI-4; ILO-6 PI-5;)
6. Students have an ability to work in a team (ILO-8)
7. Students have an ability to communicate the results of analyses conducted on multivariate data orally and in writing in the form of scientific articles. (ILO-7 PI-1; ILO-7 PI-2; ILO7 PI-3)
9. ***Brief list of topics to be covered***
1. The scope of multivariate analysis 2. Graphical Presentation of Multivariate Data 3. Hypothesis Testing on the difference of the mean vector and variance matrix 4. Cluster Analysis 5. Principal Component Analysis 6. Factor Analysis 7. Canonical Correlation Analysis

8. Discriminant Analysis
9. Biplot Analysis
10. Correspondence Analysis
11. Multiple Dimensional Scaling

10. Learning and teaching methods

Project-based method and student center learning

11. Language of instruction

Bahasa

12. Assessment methods and criteria

Summative Assessment :
1. Mid-term exam: 30%
3. Quiz: 5%

Formative Assessment:
1. Tasks: 10%
2. Discussion: 5%
3. Project : 50%