Module Description/Course Syllabi

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

1. *Course number and name*

MAT62211 Introduction to Matrix Algebra

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

3 sks / 4,53 ECTS

3. *Instructors and course coordinator*

1. Dr. Yanita

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

1. R. Piziak & P. L. Odell. 2007. Matrix Theory: From Generalized Inverses to Jordan Form, Chapman & Hall CRC, USA

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

2. A. B. Israel & T.N.E. Greville. 2003. Generalized Inverses: Theory and Application, 2nd ed. Springer-Verlag, New York

6. *Specific course information*

A. Brief description of the content of the course (catalog description)

This course will provide and discuss several fundamental concepts in matrix theory. This course also provides a vehicle for students to practice creative thinking in solving problems in matrix theory. This course is given with an emphasis on giving students a lot of time to carry out problem-solving ranging from simple problems to quite complex ones.

B. Prerequisites or co-requisites
-
C. Indicate whether a required or elective course in the program
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D. Level of course unit (according to EQF: first cycle Bachelor, second cycle Master)
Second Cycle Master
E. Year of study when the course unit is delivered (if applicable)
2nd Year
F. Semester when the course unit is delivered
even Semester
G. Mode of delivery (face-to-face, distance learning)
Face to face (a combination of Teacher-Centered Learning and Student-Centered Learning)

7. *Intended Learning Outcomes*
ILO 2: Possesses profound knowledge of the basic concept mathematics PI-1: An ability to explain the basic concept mathematics PI-2: An ability to give examples related to 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 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-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 the proper concept and mathematical fundamental techniques
ILO 5: An ability formally and correctly proves a simple mathematical statement 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
8. *Course Learning Outcomes*
1. Able to prove the properties of the unit matrix, transvection matrix, dilation matrix, and permutation matrix (ILO 2: PI 1, 2, 3; ILO 3: PI 1, 2)
2. Able to understand and prove special formulas in matrices (Hendersen Searle formula, Banacheiwicz inver formula, and Schur complement) (ILO 3: PI 1, 2, 3; ILO 4, PI 1; ILO 5, PI 1, 2, 3)
3. Able to factor matrices with various types of factorizations (LU factorization, Hermite factorization, full rank factorization, and singular value decomposition) (ILO 4: PI 1, 2, 3; ILO 5: PI 1, 2, 3)
4. Able to determine the pseudo-inverse of a matrix (left inverse, right inverse, and Moore-Penrose inverse) (ILO 4: PI 1, 2, 3; ILO 5: PI 1, 2, 3)
9. *Brief list of topics to be covered*

1. Unit Matrix
2. Transvection Matrix
3. Dilation Matrix
4. Permutasi Matrix
5. Schur's Complement
6. Banacheiwicz Inverse Formula
7. Henderson Searle Formula
8. LU Dekomposition (Faktorization)
9. Permutation Matrix and LU Dekomposition
10. Singular Value Dekomposition
11. Eselon Hermite Form
12. Full Rank Faktorization
13. Left Inverse and Right Inverse
14. Moore-Penrose Inverse

10. Learning and teaching methods

Directed Learning, Teacher Center Learning

11. Language of instruction

Bahasa Indonesia and English

12. Assessment methods and criteria

Summative Assessment :
1. Task/homework : 20%
2. Quizzes : 20%

Formative Assessment:
2. Mid-term exam : 30%
3. Final exam: 30%