



Linear Algebra

Module Name	Course Module
Module Level	Degree program
Code, if applicable	3115-071-3
Subtitles, if applicable	-
Course, if applicable	Linear Algebra
Semester(s) in which the module is taught	1 (Odd Semester)
Person responsible for the modules	Dr. Ellis Salsabila M.Sc
Lecturer(s)	Dr. Ellis Salsabila M.Si, Dr. Asked Deniyanti M.Si, Dr. Anni Sofia
Language	Indonesian
Relations to Curriculum	This course is a compulsory course provided in the first semester (1)
Type of teaching, contact hours	<p>The teaching methods used in this course are:</p> <ul style="list-style-type: none"> - Studying (that is, group material presentations, group discussions and class discussions) - Structured assignments (i.e. individual and group practice essays) <p>The class size for the lecture is 30 students. Contact hours for lectures are 26.66 hours, assignments are 32.00 hours, and independent study is 32.00 hours.</p>
Workload	For this course, students are required to meet the minimum 90.66 hours in one semester, consisting of: 26.66 hours for lectures, 32.00 hours for structured tasks, 32.00 hours for self study,
Credit Points	3.00 ECTS
Requirements according to the examination regulations	Students must attend all lectures and submit all individual and group assignments scheduled before the final exam.
Recommended prerequisites	Students must attend all lectures and submitted all individual and group assignments scheduled before the final exam.
Program intended	<p>PLO 1. Able to uphold human values in carrying out duties based on religion, morals and ethics</p> <p>PLO 5. Able to master the basics of mathematical</p>



MINISTRY OF EDUCATION, CULTURE, RESEARCH, AND TECHNOLOGY
UNIVERSITAS NEGERI JAKARTA
FACULTY OF MATHEMATICS AND NATURAL SCIENCE

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<p>learning outcomes</p>	<p>theoretical concepts, including mathematical logic, discrete mathematics, algebra, analysis and geometry as well as probability theory and statistics</p> <p><i>Course Learning Outcomes</i>(CLO) to be achieved in this course are:</p> <p>CLO 1 : Completing the Linear Equation System (SPL) and analyzing the results of solving SST and Homogeneous SST</p> <p>CLO 2 : Understand matrices and matrix operations to determine the inverse matrix of elementary matrices</p> <p>CLO 3 : Understand the determinant function, the properties of the determinant function and ways to calculate the determinant with row reduction, develop the basic properties of the determinant function, cofactor expansion and Cramer's rule</p> <p>CLO 4 : Understand vectors, operations on vectors, dot product and cross product of two vectors and vector projections on R^2 and R^3 and R^n</p> <p>CLO 5 : Understand general vector spaces, subspaces, linear combinations, vectors spanning vector spaces and linear independent vectors to determine the basis and dimensions of a vector space and changes to the basis</p> <p>CLO 6 : Understand about row space and column space and can calculate matrix rank</p> <p>CLO 7 : Understand the inner product space, norm, distance, angle, and orthogonal of two vectors in the inner product space and be skilled in determining the orthonormal basis with the Gram-Schmidt Process</p> <p>CLO 8 : Determine the eigenvalues and eigenvectors to find the diagonal matrix and the diagonal matrix values in the changing matrix</p> <p>The relationship between PLO and CLO in this course is described as follows:</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">CLO</th> <th colspan="2">PLO</th> </tr> <tr> <th>1</th> <th>5</th> </tr> </thead> <tbody> <tr> <td>1</td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <td>2</td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table>	CLO	PLO		1	5	1			2		
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Content	<p>Students will learn about:</p> <ol style="list-style-type: none"> 8. System of Linear Equations 9. System of Homogeneous Linear Equations 10. Matrix, Matrix Operations and Its Properties 11. Determinant 12. Row-2, Row-3 and Row-n 13. Vector Spaces and Subspaces 14. Stretching, Linear Freedom 15. Base and Dimensions 16. Row Space, Column Space and Null Matrix Space 17. Rank and Nullity Matrix 18. Eigenvalues, Eigenvectors, and Eigenspaces 19. Diagonalized 20. Inner Product Space 21. Orthogonal Basis, Orthonormal Basis, and the Gram-Schmidt Process 22. Orthogonal Matrix and Orthogonal Diagonalization 																		
Forms of Assessment	<p>Assessment of the learning process according to the following components: assignment 30%, mid exam 35%, final exam 35%.</p>																		
Study and examination requirements and forms of examination	<p>Study and exam requirements:</p> <ul style="list-style-type: none"> - Students must be present 15 minutes before class starts. - Students must turn off all electronic devices. - Students are required to notify the lecturer if they are absent from class due to illness, etc. - Students must turn in all classwork before the exam deadline. - Students must take an exam to get a final grade. <p>Examination form: Exam form: face to face and written</p>																		
Media employed	<p>laptops, Internet, LCDs, Whiteboard, Zoom/Google Class/Ms. Teams, and LMS</p>																		



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Reading list	Main Reference
	Elementary Linear Algebra, Applications Version, 11th Edition, Howard Anton & Chris Rorres.