



**UNIVERSITAS NEGERI PADANG**  
FACULTY OF MATHEMATICS AND NATURAL SCIENCES  
MATHEMATICS DEPARTMENT, MATHEMATICS EDUCATION STUDY PROGRAM  
Main Campus Universitas Negeri Padang.  
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## Bachelor of Mathematics Education

## MODULE HANDBOOK

Module name:	Elementary Linear Algebra
Module level, if applicable:	Bachelor
Code:	MAT1.61.3304
Sub-heading, if applicable:	-
Classes, if applicable:	Elementary Linear Algebra
Semester:	3 <sup>rd</sup> (third)
Module coordinator:	Dra. Sri Elniati, M.A.
Lecturer(s):	Dra. Sri Elniati, M.A., and Team
Language:	Bahasa Indonesia and English
Classification within the curriculum:	Study Program Compulsory Course
Teaching format / class hours per week during the semester:	Teaching format: <ul style="list-style-type: none"><li>• Lectures: Problem Based Learning, Group discussion, expository, simulation</li><li>• Structured assignment</li><li>• Independent activities</li><li>• Practice</li></ul> 4 x 170 minutes = 680 minutes = 11.33 hours
Workload:	16 weeks per semester include Midterm Exam and Final Exam which consist of: <ul style="list-style-type: none"><li>• 2.50 hours lectures (3 x 50 minutes) per week,</li><li>• 3 hours structured assignments (3x 60 minutes) per week,</li><li>• 3 hours independent activities (3 x 60 minutes) per week</li><li>• 2.83 hours practice (1 x 170 minute) per week</li></ul> 16 x 170 x 4 = 10880 minute = 181.33 hours = 6.04 ECTS
Credit points:	4 SKS (6.04 ECTS)
Prerequisite's course(s):	1. Calculus

	2. Introduction Basic Mathematics
Course outcomes:	<p>After taking this course, the students have ability to:</p> <p>CO1 : Express matrix concepts, systems of linear equations, determinants, vector space, basis, inner space, Gram Schmidt process, linear transformations and eigenvalues.</p> <p>CO2 : Interpret concepts and relationships between matrix concepts, systems of linear equations, determinants, vector space, bases, inner space, Gram Schmidt process, linear transformations and eigenvalues.</p> <p>CO3. : Apply concepts and relationships between matrix concepts, systems of linear equations, determinants, vector space, base, inner space, Gram Schmidt process, linear transformations and eigenvalues in problem solving.</p> <p>CO4. : Analyze problems related to concepts and concepts between matrix concepts, systems of linear equations, determinants, vector space, basis, inner space, Gram Schmidt process, linear transformations and eigenvalues.</p> <p>CO 5 : Show responsibility attitude towards works by self and by team works.</p>
Content:	<p>This course discusses:</p> <ol style="list-style-type: none"> <li>1. systems of linear equations and matrices introduction to systems of linear equations, Gaussian elimination, matrices and matrix operations, inverses; rules of matrix arithmetic, further results on systems of equations and inevitability, diagonal, triangular, and symmetric matrices</li> <li>2. determinants</li> <li>3. vectors in 2-space and 3-space introduction to vectors (geometric), norm of a vector; vector arithmetic, dot product; projections, cross product, lines and planes in 3-space</li> <li>4. Euclidean vector spaces</li> <li>5. general vector spaces real vector spaces, subspaces, linear independence, basis and dimension, row space, column space</li> <li>6. inner product spaces inner products, angle and orthogonality in inner product spaces, orthonormal bases: gram-Schmidt process, decomposition, change of basis, orthogonal matrices.</li> <li>7. eigenvalues, eigenvectors</li> </ol>

	eigenvalues and eigenvectors, diagonalization, orthogonal diagonalization.
Study/exam achievements:	<p>Total Score = (30 % x Midterm Exam Score) + (35% x Final Exam Score) + (25% x Assignment: project assignments, Quiz) + (10% x Affective Score: responsibility, class attendance)</p> <p>The initial cut - off points for grades A, A-, B+, B, B-, C+, C, C-, and D should not be less than 85, 80, 75, 70, 65, 60, 55, 50, and 40 out of 100 respectively.</p> <p><b>Explanation:</b></p> <p><b>1. Midterm Exam</b></p> <ul style="list-style-type: none"> <li>✓ Midterm Exam will be conducted in the 9<sup>th</sup> meeting</li> <li>✓ Midterm Exam is in the form of a written test (essay test) and will be conducted in the classroom</li> <li>✓ The time allocation is 120 minutes according to the module schedule</li> </ul> <p><b>2. Final Exam</b></p> <ul style="list-style-type: none"> <li>✓ Final Exam will be conducted in the 16<sup>th</sup> meeting.</li> <li>✓ Final Exam is in the form of a written test (essay) and will be conducted in the classroom.</li> <li>✓ The time allocation is 120 minutes which follows the Final Exam schedule provided by the Department.</li> </ul> <p><b>3. Assignment</b></p> <ul style="list-style-type: none"> <li>✓ Quiz: Quiz is given every day before closing the class. It is to assess students' understanding about the concept that has been learned. The quiz is held about 15 minutes and consists of two or three questions.</li> <li>✓ Project assignment: Students creates 20 problems related to the topics that have been learned. After that, the students exchange problems sheet with their peer, then solve their peer's problems.</li> </ul> <p><b>4. Affective Assessment</b></p> <ul style="list-style-type: none"> <li>✓ Affective asesment is held in every meeting by observing students' attitude in the classroom.</li> <li>✓ The assesment is based on the observation sheet by using the given scoring rubrics</li> </ul>
Forms of media:	White-board, Laptop, LCD Projector, Free Pascal 2.6 or a later version
Literature:	<ol style="list-style-type: none"> <li>1. Larson, R. (2016). <i>Elementary linear algebra</i>. Cengage Learning.</li> <li>2. Wiley Andrilli, S. (2016). <i>Elementary Linear Algebra</i> 5th ed. Academic Press.</li> <li>3. Matthews, K. R. (2012). <i>Elementary linear algebra</i>.</li> <li>4. Anton, H., &amp; Rorres, C. (2013). <i>Elementary linear algebra: applications version</i>. John Wiley &amp; Sons.</li> <li>5. John Wiley, (2011). 2. E. Kreyszig. <i>Advanced Engineering Mathematics – 10th Edition</i>, John Wiley,</li> <li>6. H. Anton, C. Rorres. (2010). <i>Elementary Linear Algebra – Application Version – 10th Edition</i>,</li> </ol>

