



**Universitas Negeri Surabaya  
Vocational Faculty,  
D4 Informatics Management Study Program**

Document Code

**SEMESTER LEARNING PLAN**

<b>Courses</b>	<b>CODE</b>	<b>Course Family</b>	<b>Credit Weight</b>			<b>SEMESTER</b>	<b>Compilation Date</b>																																	
Linear and Matrix Algebra	5730102158		T=2	P=0	ECTS=3.18	3	July 17, 2024																																	
<b>AUTHORIZATION</b>	<b>SP Developer</b>		<b>Course Cluster Coordinator</b>			<b>Study Program Coordinator</b>																																		
	.....		.....			Dodik Arwin Dermawan, S.ST., S.T., M.T.																																		
<b>Learning model</b>	Case Studies																																							
<b>Program Learning Outcomes (PLO)</b>	PLO study program that is charged to the course																																							
	Program Objectives (PO)																																							
	PLO-PO Matrix																																							
		P.O																																						
<b>Short Course Description</b>	PO Matrix at the end of each learning stage (Sub-PO)																																							
		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%; text-align: center;">P.O</td> <td colspan="16" style="text-align: center;">Week</td> </tr> <tr> <td></td> <td style="text-align: center;">1</td> <td style="text-align: center;">2</td> <td style="text-align: center;">3</td> <td style="text-align: center;">4</td> <td style="text-align: center;">5</td> <td style="text-align: center;">6</td> <td style="text-align: center;">7</td> <td style="text-align: center;">8</td> <td style="text-align: center;">9</td> <td style="text-align: center;">10</td> <td style="text-align: center;">11</td> <td style="text-align: center;">12</td> <td style="text-align: center;">13</td> <td style="text-align: center;">14</td> <td style="text-align: center;">15</td> <td style="text-align: center;">16</td> </tr> </table>						P.O	Week																	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																								
<b>References</b>	<p><b>Main :</b></p> <ol style="list-style-type: none"> <li>1. H. Anton, C. Rorres. Elementary Linear Algebra – Application Version – 10th Edition, John Wiley, 2010.</li> <li>2. E. Kreyszig. Advanced Engineering Mathematics – 10th Edition, John Wiley, 2011.</li> <li>3. S. Lang. Introduction to Linear Algebra (Undergraduate Text in Mathematics) – 2nd Edition, Springer, 1997.</li> <li>4. S. J. Leon. Linear Algebra with Applications – 8th Edition, Pearson, 2009.</li> <li>5. G. Strang. Linear Algebra and Its Application – 3rd Edition, Cengage Learning, 2005.</li> </ol> <p><b>Supporters:</b></p>																																							
<b>Supporting lecturer</b>	Asmunin, S.Kom., M.Kom. Martini Dwi Endah Susanti, S.Kom., M.Kom.																																							
<b>Week-</b>	<b>Final abilities of each learning stage (Sub-PO)</b>	<b>Evaluation</b>		<b>Help Learning, Learning methods, Student Assignments, [ Estimated time ]</b>		<b>Learning materials [ References ]</b>	<b>Assessment Weight (%)</b>																																	
		<b>Indicator</b>	<b>Criteria &amp; Form</b>	<b>Offline ( offline )</b>	<b>Online ( online )</b>																																			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)																																	

1	Know and understand the concept of matrices and their operations.	<ol style="list-style-type: none"> <li>1. Students understand: the meaning of a matrix and several terminology related to a matrix</li> <li>2. simple operations of matrix algebra: addition, multiplication of matrices by scalars, and multiplication of matrices</li> <li>3. understanding matrix inverse, properties of matrix inverse</li> <li>4. algebraic properties of matrices.</li> </ol>		Discussion 2 X 50			0%
2	Know and understand the concept of matrices and their operations.	<ol style="list-style-type: none"> <li>1. Students understand: the meaning of matrices and some terminology related to matrices</li> <li>2. simple operations of matrix algebra: addition, multiplication of matrices by scalars, and multiplication of matrices</li> <li>3. understanding matrix inverse, properties of matrix inverse</li> <li>4. algebraic properties of matrices.</li> </ol>	<b>Criteria:</b> question and answer	Discussion 2 X 50			0%

3	<p>Understand the meaning of a system of linear equations (SPL) and be able to determine whether a system of equations is SPL or not. Understand the relationship between SPL and matrices. Understand how to represent SPL using matrices</p>	<ol style="list-style-type: none"> <li>1. Students understand: the definition of a system of linear equations (SPL) and its basic properties</li> <li>2. how to represent SPL in matrix form (augmented matrix and matrix equation).</li> <li>3. how to perform elementary row operations on a matrix</li> <li>4. how to find the SPL solution using Gauss-Jordan elimination</li> </ol>		Discussion 2 X 50			0%
4	<p>Understand the meaning of a system of linear equations (SPL) and be able to determine whether a system of equations is SPL or not. Understand the relationship between SPL and matrices. Understand how to represent SPL using matrices.</p>	<ol style="list-style-type: none"> <li>1. Students understand: the definition of a system of linear equations (SPL) and its basic properties</li> <li>2. how to represent SPL in matrix form (augmented matrix and matrix equation).</li> <li>3. how to perform elementary row operations on a matrix</li> <li>4. how to find the SPL solution using Gauss-Jordan elimination.</li> </ol>		Discussion 2 X 50			0%

5	Understand the meaning of a system of linear equations (SPL) and be able to determine whether a system of equations is SPL or not. Understand the relationship between SPL and matrices. Understand how to represent SPL using matrices.	<ol style="list-style-type: none"> <li>1. Students understand: the definition of a system of linear equations (SPL) and its basic properties</li> <li>2. how to represent SPL in matrix form (augmented matrix and matrix equation).</li> <li>3. how to perform elementary row operations on a matrix</li> <li>4. how to find the SPL solution using Gauss-Jordan elimination.</li> </ol>		Discussion and Lecture 2 X 50			0%
6	Understand how to determine the inverse of a matrix using elementary row operations (OBE). Understand how to determine the solution to a system of linear equations of n equations and n variables using the inverse method.	<ol style="list-style-type: none"> <li>1. Students understand: the steps in determining the inverse of a matrix through elementary row operations</li> <li>2. How to determine the SPL solution for n equations and n variables using the inverse method.</li> </ol>		Discussion and lecture 2 X 50			0%
7	Understand how to determine the inverse of a matrix using elementary row operations (OBE). Understand how to determine the solution to a system of linear equations of n equations and n variables using the inverse method	<ol style="list-style-type: none"> <li>1. Students understand: the steps in determining the inverse of a matrix through elementary row operations</li> <li>2. How to determine the SPL solution for n equations and n variables using the inverse method.</li> </ol>		lectures and discussions 2 X 50			0%
8	UTS			2 X 50			0%

9	Understand the definition of the determinant of a square matrix. Understand how to determine the determinant of a square matrix.	<ol style="list-style-type: none"> <li>1. Students understand: definition of the determinant of a square matrix</li> <li>2. how to calculate the determinant of a square matrix with cofactor expansion</li> <li>3. how to calculate the determinant of a square matrix using elementary row operations (OBE).</li> </ol>		Lectures and discussions 2 X 50			0%
10	Understand the relationship between the determinant and inverse of a square matrix. Understand the relationship between the determinant, inverse, and SPL with n equations and n variables.	<ol style="list-style-type: none"> <li>1. Students understand: the relationship between determinants and the existence of inverses in square matrices</li> <li>2. the relationship between determinants, inverses, and SPL solutions with n equations and n variables</li> <li>3. How to determine the SPL solution for n equations and n variables using Cramer's rules/method</li> <li>4. How to determine the inverse of a matrix using adjoints and determinants.</li> </ol>		Lectures and discussions 2 X 50			0%

11	Understand the relationship between the determinant and inverse of a square matrix. Understand the relationship between the determinant, inverse, and SPL with n equations and n variables.	<ol style="list-style-type: none"> <li>1. Students understand: the relationship between determinants and the existence of inverses in square matrices</li> <li>2. the relationship between determinants, inverses, and SPL solutions with n equations and n variables</li> <li>3. How to determine the SPL solution for n equations and n variables using Cramer's rules/method</li> <li>4. How to determine the inverse of a matrix using adjoints and determinants.</li> </ol>		Discussion and lecture 2 X 50			0%
12	Understand the relationship between the determinant and inverse of a square matrix. Understand the relationship between the determinant, inverse, and SPL with n equations and n variables.	<ol style="list-style-type: none"> <li>1. Students understand: the relationship between determinants and the existence of inverses in square matrices</li> <li>2. the relationship between determinants, inverses, and SPL solutions with n equations and n variables</li> <li>3. How to determine the SPL solution for n equations and n variables using Cramer's rules/method</li> <li>4. How to determine the inverse of a matrix using adjoints and determinants.</li> </ol>		Discussion and lecture 2 X 50			0%

13	Understand the relationship between the material that has been explained: matrices, systems of linear equations, and determinants.	<ol style="list-style-type: none"> <li>1. Students understand: the relationship between the material that has been explained: matrices, systems of linear equations, and determinants</li> <li>2. basic properties of matrix algebra</li> <li>3. use of elementary row operations and Gauss-Jordan elimination on matrices, systems of linear equations, and determinants.</li> </ol>		2 X 50 discussions and lectures			0%
14	Understand the relationship between the material that has been explained: matrices, systems of linear equations, and determinants.	<ol style="list-style-type: none"> <li>1. Students understand: the relationship between the material that has been explained: matrices, systems of linear equations, and determinants</li> <li>2. basic properties of matrix algebra</li> <li>3. use of elementary row operations and Gauss-Jordan elimination on matrices, systems of linear equations, and determinants</li> </ol>		Discussion and lecture 2 X 50			0%

15	Understand the definition of the basis and dimensions of a vector space. Understand the relationship between the basis and dimensions of a vector space and its subspaces.	<ol style="list-style-type: none"> <li>1. Students understand: the meaning of basis sets in a vector space</li> <li>2. how to check whether a set of vectors is a basis or not</li> <li>3. understanding dimensions in a vector space</li> <li>4. how to determine the dimensions of a vector space</li> <li>5. the relationship between the basis and dimensions of a vector space and its subspaces.</li> </ol>		Discussion and lecture 2 X 50			0%
16	UAS			2 X 50			0%

#### Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
		0%

#### Notes

1. **Learning Outcomes of Study Program Graduates (PLO - Study Program)** are the abilities possessed by each Study Program graduate which are the internalization of attitudes, mastery of knowledge and skills according to the level of their study program obtained through the learning process.
2. **The PLO imposed on courses** are several learning outcomes of study program graduates (CPL-Study Program) which are used for the formation/development of a course consisting of aspects of attitude, general skills, special skills and knowledge.
3. **Program Objectives (PO)** are abilities that are specifically described from the PLO assigned to a course, and are specific to the study material or learning materials for that course.
4. **Subject Sub-PO (Sub-PO)** is a capability that is specifically described from the PO that can be measured or observed and is the final ability that is planned at each learning stage, and is specific to the learning material of the course.
5. **Indicators for assessing** ability in the process and student learning outcomes are specific and measurable statements that identify the ability or performance of student learning outcomes accompanied by evidence.
6. **Assessment Criteria** are benchmarks used as a measure or measure of learning achievement in assessments based on predetermined indicators. Assessment criteria are guidelines for assessors so that assessments are consistent and unbiased. Criteria can be quantitative or qualitative.
7. **Forms of assessment:** test and non-test.
8. **Forms of learning:** Lecture, Response, Tutorial, Seminar or equivalent, Practicum, Studio Practice, Workshop Practice, Field Practice, Research, Community Service and/or other equivalent forms of learning.
9. **Learning Methods:** Small Group Discussion, Role-Play & Simulation, Discovery Learning, Self-Directed Learning, Cooperative Learning, Collaborative Learning, Contextual Learning, Project Based Learning, and other equivalent methods.
10. **Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
11. **The assessment weight** is the percentage of assessment of each sub-PO achievement whose size is proportional to the level of difficulty of achieving that sub-PO, and the total is 100%.
12. TM=Face to face, PT=Structured assignments, BM=Independent study.