



Universitas Negeri Surabaya
Faculty of Engineering,
Electrical Engineering Undergraduate Study Program

Document
Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date																																																																																			
Linear Algebra and Discrete Structures	2020102426	Compulsory Study Program Subjects	T=2	P=0	ECTS=3.18	4	February 15, 2024																																																																																			
AUTHORIZATION	SP Developer		Course Cluster Coordinator			Study Program Coordinator																																																																																				
	Unit Three Kartini, S.T., M.T., Ph.D		Unit Three , S.T., M.T., Ph.D			Dr. Lusia Rakhmawati, S.T., M.T.																																																																																				
Learning model	Case Studies																																																																																									
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																																																																									
	Program Objectives (PO)																																																																																									
	PO - 1	explains the definitions of Linear Algebra and Discrete Structures, learning contract, literature and introduction to numerical methods																																																																																								
	PO - 2	explains the application of determinants																																																																																								
	PO - 3	implementing graphs																																																																																								
	PLO-PO Matrix																																																																																									
		<table border="1" style="margin: auto;"> <tr><td>P.O</td></tr> <tr><td>PO-1</td></tr> <tr><td>PO-2</td></tr> <tr><td>PO-3</td></tr> </table>						P.O	PO-1	PO-2	PO-3																																																																															
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PO Matrix at the end of each learning stage (Sub-PO)																																																																																										
	<table border="1" style="margin: auto;"> <thead> <tr> <th rowspan="2">P.O</th> <th colspan="16">Week</th> </tr> <tr> <th>1</th><th>2</th><th>3</th><th>4</th><th>5</th><th>6</th><th>7</th><th>8</th><th>9</th><th>10</th><th>11</th><th>12</th><th>13</th><th>14</th><th>15</th><th>16</th> </tr> </thead> <tbody> <tr><td>PO-1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>PO-2</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>PO-3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </tbody> </table>						P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PO-1																	PO-2																	PO-3																
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Short Course Description	The Linear Algebra and Discrete Structures course is a basic mathematics course that discusses Systems of Linear Equations, Matrices, Determinants, Vectors, Eigen Value & Eigen Vector, as well as the basic concepts of discrete mathematics.																																																																																									
References	Main :																																																																																									
	1. 1. Howard Anton and Chriis Rorres, 11th Edition of Elementary Linear Algebra, 2014																																																																																									
	Supporters:																																																																																									
1. 1. Kenneth H. Rosen, 7th Edition of Discrete Mathematics and Its Applications																																																																																										
Supporting lecturer	Prof. Dr. I Gusti Putu Asto Buditjahjanto, S.T., M.T. Unit Three Kartini, S.T., M.T., Ph.D.																																																																																									

Week-	Final abilities of each learning stage (Sub-PO)	Evaluation		Help Learning, Learning methods, Student Assignments, [Estimated time]		Learning materials [References]	Assessment Weight (%)
		Indicator	Criteria & Form	Offline (offline)	Online (online)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Students study the material presented by the lecturer and then discuss the material by referring to references and other sources of information (internet, etc.)	1. Ability to explain 2. Enthusiasm and activeness in asking questions 3. Activeness in discussing	<p>Criteria: The assessment criteria are carried out by looking at the following aspects: 1. Participation: carried out by observing student activities (weight 2) 2. UTS: carried out with assessments during the middle of the semester (weight 2) 3. UAS: carried out every semester to measure all indicators (weight 3) 4. Assignments: carried out on each indicator (weight 3) Final Student Score: Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</p> <p>Form of Assessment : Participatory Activities</p>	Self directed learning 2 x 50		<p>Material: Basic introduction to linear algebra References: 1. Howard Anton and Chriss Rorres, 11th Edition of Elementary Linear Algebra, 2014</p>	1%
2	Ability to explain • Enthusiasm and activeness in asking • Completeness and accuracy in answering questions • Active discussion • Skills and correctness of analysis	Student final grades come from all assessment components including: 1. knowledge assessment (40%), 2. skills assessment (50%), and 3. attitude assessment (10%)	<p>Criteria: The assessment criteria are carried out by looking at the following aspects: 1. Participation: carried out by observing student activities (weight 2) 2. UTS: carried out with assessments during the middle of the semester (weight 2) 3. UAS: carried out every semester to measure all indicators (weight 3) 4. Assignments: carried out on each indicator (weight 3) Final Student Score: Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</p> <p>Form of Assessment : Participatory Activities</p>	Self directed learning 2 x 50		<p>Material: Linear Equations References: 1. Howard Anton and Chriss Rorres, 11th Edition of Elementary Linear Algebra, 2014</p>	1%

3	Ability to explain • Enthusiasm and activeness in asking • Completeness and accuracy in answering questions • Active discussion • Skills and correctness of analysis	Student final grades come from all assessment components including: 1. knowledge assessment (40%), 2. skills assessment (50%), and 3. attitude assessment (10%)	<p>Criteria: The assessment criteria are carried out by looking at the following aspects: 1. Participation: carried out by observing student activities (weight 2) 2. UTS: carried out with assessments during the middle of the semester (weight 2) 3. UAS: carried out every semester to measure all indicators (weight 3) 4. Assignments: carried out on each indicator (weight 3) Final Student Score: Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</p> <p>Form of Assessment : Participatory Activities</p>	Self-directed learning 2 x 50		<p>Material: Linear Equations and Gauss Seidel References: 1. Howard Anton and Chriss Rorres, 11th Edition of Elementary Linear Algebra, 2014</p>	1%
4	Ability to explain • Enthusiasm and activeness in asking • Completeness and accuracy in answering questions • Active discussion • Skills and correctness of analysis	Student final grades come from all assessment components including: 1. knowledge assessment (40%), 2. skills assessment (50%), and 3. attitude assessment (10%)	<p>Criteria: The assessment criteria are carried out by looking at the following aspects: 1. Participation: carried out by observing student activities (weight 2) 2. UTS: carried out with assessments during the middle of the semester (weight 2) 3. UAS: carried out every semester to measure all indicators (weight 3) 4. Assignments: carried out on each indicator (weight 3) Final Student Score: Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</p> <p>Form of Assessment : Participatory Activities, Tests</p>	Self-directed learning 2 x 50		<p>Material: Linear Equations and Gauss Seidel References: 1. Howard Anton and Chriss Rorres, 11th Edition of Elementary Linear Algebra, 2014</p>	3%

5	Ability to explain • Enthusiasm and activeness in asking • Completeness and accuracy in answering questions • Active discussion • Skills and correctness of analysis	Student final grades come from all assessment components including: 1. knowledge assessment (40%), 2. skills assessment (50%), and 3. attitude assessment (10%)	<p>Criteria: The assessment criteria are carried out by looking at the following aspects: 1. Participation: carried out by observing student activities (weight 2) 2. UTS: carried out with assessments during the middle of the semester (weight 2) 3. UAS: carried out every semester to measure all indicators (weight 3) 4. Assignments: carried out on each indicator (weight 3) Final Student Score: Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</p> <p>Form of Assessment : Participatory Activities, Tests</p>	Self-directed learning 2 x 50		<p>Material: Linear Equations and Gauss Seidel References: 1. Howard Anton and Chriss Rorres, 11th Edition of Elementary Linear Algebra, 2014</p>	3%
6	Ability to explain • Enthusiasm and activeness in asking • Completeness and accuracy in answering questions • Active discussion • Skills and correctness of analysis	Student final grades come from all assessment components including: 1. knowledge assessment (40%), 2. skills assessment (50%), and 3. attitude assessment (10%)	<p>Criteria: The assessment criteria are carried out by looking at the following aspects: 1. Participation: carried out by observing student activities (weight 2) 2. UTS: carried out with assessments during the middle of the semester (weight 2) 3. UAS: carried out every semester to measure all indicators (weight 3) 4. Assignments: carried out on each indicator (weight 3) Final Student Score: Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</p> <p>Form of Assessment : Participatory Activities, Tests</p>	Self-directed learning 2 x 50		<p>Material: Gauss elimination method • Gauss-Jordan elimination method • Jacob iteration method • Iteration method References: 1. Howard Anton and Chriss Rorres, 11th Edition of Elementary Linear Algebra, 2014</p>	3%

7	<p>Ability to explain • Enthusiasm and activeness in asking • Completeness and accuracy in answering questions • Active discussion • Skills and correctness of analysis</p>	<p>Student final grades come from all assessment components including: 1. knowledge assessment (40%), 2. skills assessment (50%), and 3. attitude assessment (10%)</p>	<p>Criteria: The assessment criteria are carried out by looking at the following aspects: 1. Participation: carried out by observing student activities (weight 2) 2. UTS: carried out with assessments during the middle of the semester (weight 2) 3. UAS: carried out every semester to measure all indicators (weight 3) 4. Assignments: carried out on each indicator (weight 3) Final Student Score: Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</p> <p>Form of Assessment : Participatory Activities, Tests</p>	<p>Self-directed learning 2 x 50</p>		<p>Material: Gauss-Seidel • LU decomposition method • Cholesky decomposition method References: 1. Howard Anton and Chriss Rorres, 11th Edition of Elementary Linear Algebra, 2014</p>	<p>3%</p>
8	<p>Ability to explain • Enthusiasm and activeness in asking • Completeness and accuracy in answering questions • Active discussion • Skills and correctness of analysis</p>	<p>Student final grades come from all assessment components including: 1. knowledge assessment (40%), 2. skills assessment (50%), and 3. attitude assessment (10%)</p>	<p>Criteria: The assessment criteria are carried out by looking at the following aspects: 1. Participation: carried out by observing student activities (weight 2) 2. UTS: carried out with assessments during the middle of the semester (weight 2) 3. UAS: carried out every semester to measure all indicators (weight 3) 4. Assignments: carried out on each indicator (weight 3) Final Student Score: Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</p> <p>Form of Assessment : Participatory Activities, Tests</p>	<p>Self-directed learning 2 x 50</p>		<p>Material: Midterm Exam References: 1. Howard Anton and Chriss Rorres, 11th Edition of Elementary Linear Algebra, 2014</p>	<p>20%</p>

9	Ability to explain • Enthusiasm and activeness in asking • Completeness and accuracy in answering questions • Active discussion • Skills and correctness of analysis	Student final grades come from all assessment components including: 1. knowledge assessment (40%), 2. skills assessment (50%), and 3. attitude assessment (10%)	<p>Criteria: The assessment criteria are carried out by looking at the following aspects: 1. Participation: carried out by observing student activities (weight 2) 2. UTS: carried out with assessments during the middle of the semester (weight 2) 3. UAS: carried out every semester to measure all indicators (weight 3) 4. Assignments: carried out on each indicator (weight 3) Final Student Score: Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</p> <p>Form of Assessment : Participatory Activities</p>	Self-directed learning 2 x 50		<p>Material: Vector Spaces (Euclidean & General) References: 1. Howard Anton and Chriss Rorres, 11th Edition of Elementary Linear Algebra, 2014</p>	5%
10	Ability to explain • Enthusiasm and activeness in asking • Completeness and accuracy in answering questions • Active discussion • Skills and correctness of analysis	Student final grades come from all assessment components including: 1. knowledge assessment (40%), 2. skills assessment (50%), and 3. attitude assessment (10%)	<p>Criteria: The assessment criteria are carried out by looking at the following aspects: 1. Participation: carried out by observing student activities (weight 2) 2. UTS: carried out with assessments during the middle of the semester (weight 2) 3. UAS: carried out every semester to measure all indicators (weight 3) 4. Assignments: carried out on each indicator (weight 3) Final Student Score: Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</p> <p>Form of Assessment : Participatory Activities</p>	Self-directed learning 2 x 50		<p>Material: Vector Spaces (Euclidean & General) References: 1. Howard Anton and Chriss Rorres, 11th Edition of Elementary Linear Algebra, 2014</p>	5%

11	Ability to explain • Enthusiasm and activeness in asking • Completeness and accuracy in answering questions • Active discussion • Skills and correctness of analysis	Student final grades come from all assessment components including: 1. knowledge assessment (40%), 2. skills assessment (50%), and 3. attitude assessment (10%)	<p>Criteria: The assessment criteria are carried out by looking at the following aspects: 1. Participation: carried out by observing student activities (weight 2) 2. UTS: carried out with assessments during the middle of the semester (weight 2) 3. UAS: carried out every semester to measure all indicators (weight 3) 4. Assignments: carried out on each indicator (weight 3) Final Student Score: Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</p> <p>Form of Assessment : Participatory Activities</p>	Self-directed learning 2 x 50		<p>Material: Eigen Value and Eigen Vector Diagonalization References: 1. Howard Anton and Chriss Rorres, 11th Edition of Elementary Linear Algebra, 2014</p>	5%
12	Ability to explain • Enthusiasm and activeness in asking • Completeness and accuracy in answering questions • Active discussion • Skills and correctness of analysis	Student final grades come from all assessment components including: 1. knowledge assessment (40%), 2. skills assessment (50%), and 3. attitude assessment (10%)	<p>Criteria: The assessment criteria are carried out by looking at the following aspects: 1. Participation: carried out by observing student activities (weight 2) 2. UTS: carried out with assessments during the middle of the semester (weight 2) 3. UAS: carried out every semester to measure all indicators (weight 3) 4. Assignments: carried out on each indicator (weight 3) Final Student Score: Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</p> <p>Form of Assessment : Participatory Activities</p>	Self-directed learning 2 x 50		<p>Material: Eigen Value and Eigen Vector Diagonalization References: 1. Howard Anton and Chriss Rorres, 11th Edition of Elementary Linear Algebra, 2014</p>	5%

13	Ability to explain • Enthusiasm and activeness in asking • Completeness and accuracy in answering questions • Active discussion • Skills and correctness of analysis	Student final grades come from all assessment components including: 1. knowledge assessment (40%), 2. skills assessment (50%), and 3. attitude assessment (10%)	<p>Criteria: The assessment criteria are carried out by looking at the following aspects: 1. Participation: carried out by observing student activities (weight 2) 2. UTS: carried out with assessments during the middle of the semester (weight 2) 3. UAS: carried out every semester to measure all indicators (weight 3) 4. Assignments: carried out on each indicator (weight 3) Final Student Score: Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</p> <p>Form of Assessment : Participatory Activities</p>	Self-directed learning 2 x 50		<p>Material: • Sets, Set Operations, and functions Library: 1. <i>Howard Anton and Chriss Rorres, 11th Edition of Elementary Linear Algebra, 2014</i></p>	5%
14	Ability to explain • Enthusiasm and activeness in asking • Completeness and accuracy in answering questions • Active discussion • Skills and correctness of analysis	Student final grades come from all assessment components including: 1. knowledge assessment (40%), 2. skills assessment (50%), and 3. attitude assessment (10%)	<p>Criteria: The assessment criteria are carried out by looking at the following aspects: 1. Participation: carried out by observing student activities (weight 2) 2. UTS: carried out with assessments during the middle of the semester (weight 2) 3. UAS: carried out every semester to measure all indicators (weight 3) 4. Assignments: carried out on each indicator (weight 3) Final Student Score: Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</p> <p>Form of Assessment : Participatory Activities</p>	Self-directed learning 2 x 50		<p>Material: • Relations and Graphs References: 1. <i>Howard Anton and Chriss Rorres, 11th Edition of Elementary Linear Algebra, 2014</i></p>	5%

15	Ability to explain • Enthusiasm and activeness in asking • Completeness and accuracy in answering questions • Active discussion • Skills and correctness of analysis	Student final grades come from all assessment components including: 1. knowledge assessment (40%), 2. skills assessment (50%), and 3. attitude assessment (10%)	<p>Criteria: The assessment criteria are carried out by looking at the following aspects: 1. Participation: carried out by observing student activities (weight 2) 2. UTS: carried out with assessments during the middle of the semester (weight 2) 3. UAS: carried out every semester to measure all indicators (weight 3) 4. Assignments: carried out on each indicator (weight 3) Final Student Score: Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</p> <p>Form of Assessment : Participatory Activities</p>	Self-directed learning 2 x 50		<p>Material: • Relations and Graphs References: 1. Howard Anton and Chriss Rorres, 11th Edition of Elementary Linear Algebra, 2014</p>	5%
16	Ability to explain • Enthusiasm and activeness in asking • Completeness and accuracy in answering questions • Active discussion • Skills and correctness of analysis	Student final grades come from all assessment components including: 1. knowledge assessment (40%), 2. skills assessment (50%), and 3. attitude assessment (10%)	<p>Criteria: The assessment criteria are carried out by looking at the following aspects: 1. Participation: carried out by observing student activities (weight 2) 2. UTS: carried out with assessments during the middle of the semester (weight 2) 3. UAS: carried out every semester to measure all indicators (weight 3) 4. Assignments: carried out on each indicator (weight 3) Final Student Score: Participation Score (2) x Assignment Score (3) x UTS Score (2) x UAS Score (3) divided by 10.</p> <p>Form of Assessment : Participatory Activities</p>	Self-directed learning 2 x 50		<p>Material: Final Semester Exam References: 1. Howard Anton and Chriss Rorres, 11th Edition of Elementary Linear Algebra, 2014</p>	30%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	84%
2.	Test	16%
		100%

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** abilities in the process and student learning outcomes are specific and measurable statements that identify the abilities 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.