



<b>Short Course Description</b>	This course contains definitions of matrices such as the meaning of matrices and vectors, similarity of matrices and similarity of vectors, operations of matrices and vectors, typical forms of matrices; Matrix conversion such as addition and subtraction, multiplication and partitioned matrices; Matrix Determinants, minors and cofactors of determinant properties; Matrix Inversion; Solving systems of Linear Equations with Matrices; Input-Output Analysis; and Linear Programming.	
<b>References</b>	<b>Main :</b>	
	<ol style="list-style-type: none"> <li>Chiang, Alpha C. dan Wainwright K. (2006), Dasar-dasar Matematika Ekonomi: Jilid satu, Edisi Keempat, Penerbit Erlangga, Jakarta.</li> <li>Dumairy (2010), Matematika Terapan untuk Bisnis dan Ekonomi, BPFE, Yogyakarta.</li> <li>Josep Bintang Kalangi (2019). Matematika Ekonomi dan Bisnis dan Ekonomi. Salemba Empat. Jakarta Selatan.</li> </ol>	
	<b>Supporters:</b>	
	<ol style="list-style-type: none"> <li>Chiang, Alpha C. and Wainwright K. (2005), Fundamental Methods of Mathematical Econpmics, McGraw-Hill.</li> </ol>	

<b>Supporting lecturer</b>	Dr. Lucky Rachmawati, S.E., M.Si. Aprillia Nilasari, S.Pd., M.S.E. Ruth Eviana Hutabarat, S.E., M.E. Nurul Hanifa, S.E., M.Si. Dita Dismalasari Dewi, S.M., M.Sc.
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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	<ol style="list-style-type: none"> <li>Students are able to understand the meaning of matrices and vectors</li> <li>Students are able to understand matrix similarity and vector similarity</li> <li>Students are able to understand and apply matrix and vector operations</li> <li>Students are able to understand the typical forms of matrices</li> </ol>	<ol style="list-style-type: none"> <li>Explain the meaning of matrices and vectors</li> <li>Explain matrix similarity and vector similarity</li> <li>Explain and analyze the operation of matrices and vectors</li> <li>Explain the typical forms of matrices</li> </ol>	<b>Criteria:</b> According to scoring guidelines  <b>Form of Assessment :</b> Participatory Activities	Interactive lectures, discussions and case studies 3 X 50		<b>Material:</b> Matrices and Vectors <b>References:</b> Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.	3%
2	Students are able to understand and apply matrix changes: addition and subtraction	Explain and analyze matrix changes: addition and subtraction	<b>Criteria:</b> According to scoring guidelines  <b>Form of Assessment :</b> Participatory Activities	Interactive lectures, discussions and case studies 3 X 50		<b>Material:</b> Addition and Subtraction of Matrices <b>Reference:</b> Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.	4%
3	<ol style="list-style-type: none"> <li>Students are able to understand and apply matrix changes: multiplication</li> <li>Students are able to understand and apply the partitioned matrix</li> </ol>	<ol style="list-style-type: none"> <li>Explain and analyze matrix changes: multiplication</li> <li>Explain and analyze partitioned matrices</li> </ol>	<b>Criteria:</b> According to scoring guidelines  <b>Form of Assessment :</b> Participatory Activities	Interactive lectures, discussions and case studies 3 X 50		<b>Material:</b> Multiplication of Matrices and Blocked Matrices <b>References:</b> Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.	4%

4	<p>1.Students are able to understand and apply matrix determinants</p> <p>2.Students are able to understand and apply minor and cofactors to determinant properties</p>	<p>1.Explain and analyze matrix determinants</p> <p>2.Explain and analyze minor and cofactor determinant properties</p>	<p><b>Criteria:</b> According to scoring guidelines</p> <p><b>Form of Assessment :</b> Participatory Activities</p>	<p>Interactive lectures, discussions and case studies 3 X 50</p>		<p><b>Material:</b> Determinants, Minors and Cofactors</p> <p><b>References:</b> <i>Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.</i></p>	3%
5	<p>Students are able to understand and apply adjoint matrices</p>	<p>Explain and analyze adjoint matrices</p>	<p><b>Criteria:</b> According to scoring guidelines</p> <p><b>Form of Assessment :</b> Participatory Activities</p>	<p>Interactive lectures, discussions and case studies 3 X 50</p>		<p><b>Material:</b> Adjoin Matrix</p> <p><b>References:</b> <i>Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.</i></p>	3%
6	<p>1.Students are able to understand and apply matrix inversion</p> <p>2.Students are able to understand and apply inversion of a 2X2 matrix</p> <p>3.Students are able to understand and apply inversion of higher order matrices</p>	<p>1.Explain and analyze matrix inversion</p> <p>2.Explain and analyze the inversion of a 2X2 matrix</p> <p>3.Explain and analyze Inversion of higher order matrices</p>	<p><b>Criteria:</b> According to scoring guidelines</p> <p><b>Form of Assessment :</b> Participatory Activities</p>	<p>Interactive lectures, discussions and case studies 3 X 50</p>		<p><b>Material:</b> Matrix Inverse, Matrix Inversion with Adjoint and Determinant</p> <p><b>References:</b> <i>Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.</i></p> <hr/> <p><b>Material:</b> Matrix Inverse, Matrix Inversion of Order</p> <p><b>References:</b> <i>Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.</i></p>	4%

7	<p>1. Students are able to understand and apply matrix inversion with adjoints and determinants</p> <p>2. Students are able to understand and apply the properties of feedback</p>	<p>1. Explain and analyze matrix inversion with adjoint and determinant</p> <p>2. Explain and analyze the properties of feedback</p>	<p><b>Criteria:</b></p> <p>1. Every Contribution is appreciated</p> <p>2. According to scoring guidelines</p> <p><b>Form of Assessment :</b> Participatory Activities</p>	<p>Interactive lectures, discussions and case studies 3 X 50</p>		<p><b>Material:</b> Matrix Inverse, Matrix Inversion with Adjoint and Determinant</p> <p><b>References:</b> <i>Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.</i></p> <hr/> <p><b>Material:</b> Matrix Inversion with Adjoint and Determinant</p> <p><b>References:</b> <i>Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.</i></p>	4%
8	UTS	Can do questions well and correctly	<p><b>Criteria:</b> According to scoring guidelines</p> <p><b>Form of Assessment :</b> Test</p>	Written test 3 X 50		<p><b>Material:</b> MATRIX</p> <p><b>Reference:</b> <i>Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.</i></p> <hr/> <p><b>Material:</b> Material 1-7</p> <p><b>References:</b> <i>Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.</i></p>	20%

9	<p>1. Students are able to understand and apply solutions to systems of linear equations</p> <p>2. Students are able to understand and apply solutions using the Cramer matrix method</p>	<p>1. Explain and analyze solutions to systems of linear equations</p> <p>2. Explain and analyze solutions using the Cramer matrix method</p>	<p><b>Criteria:</b> According to scoring guidelines</p> <p><b>Form of Assessment :</b> Participatory Activities</p>	<p>Interactive lectures, discussions and case studies 3 X 50</p>		<p><b>Material:</b> Systems of Linear Equations</p> <p><b>References:</b> <i>Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.</i></p> <hr/> <p><b>Material:</b> Systems of Linear Equations using Cramers and inverse methods .</p> <p><b>Reference:</b> <i>Josep Bintang Kalangi (2019). Economic Mathematics and Business and Economics. Salemba Four. South Jakarta.</i></p> <hr/> <p><b>Material:</b> Systems of Linear Equations using Cramers and inverse methods.</p> <p><b>Reference:</b> <i>Josep Bintang Kalangi (2019). Economic Mathematics and Business and Economics. Salemba Four. South Jakarta.</i></p>	4%
10	<p>Students are able to understand and apply solutions using the inverse matrix method</p>	<p>Explain and analyze solutions using inverse matrices</p>	<p><b>Criteria:</b> According to scoring guidelines</p> <p><b>Form of Assessment :</b> Participatory Activities</p>	<p>Lectures, Discussions, Practice Questions 3 X 50</p>		<p><b>Material:</b> Solving using an inverse matrix</p> <p><b>Reference:</b> <i>Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.</i></p> <hr/> <p><b>Material:</b> Solving using an inverse matrix</p> <p><b>Reference:</b> <i>Josep Bintang Kalangi (2019). Economic Mathematics and Business and Economics. Salemba Four. South Jakarta.</i></p>	4%

11	<p>1. Students are able to understand and apply Input Output Analysis</p> <p>2. Students are able to understand and apply the transaction matrix</p>	<p>1. Explain and analyze input output analysis</p> <p>2. Explain and analyze the transaction matrix</p>	<p><b>Criteria:</b> According to scoring guidelines</p> <p><b>Form of Assessment :</b> Participatory Activities</p>	<p>Interactive lectures, discussions and case studies 3 X 50</p>		<p><b>Material:</b> Input Output Analysis</p> <p><b>References:</b> <i>Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.</i></p> <hr/> <p><b>Material:</b> Input Output Analysis, Transaction Matrix</p> <p><b>References:</b> <i>Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.</i></p>	4%
12	<p>1. Students are able to understand and apply the technology matrix</p> <p>2. Students are able to understand and apply input-output analysis exercises</p>	<p>1. Explain and analyze the technology matrix</p> <p>2. Explain and analyze input output analysis exercises</p>	<p><b>Criteria:</b> According to scoring guidelines</p> <p><b>Form of Assessment :</b> Participatory Activities</p>	<p>Interactive lectures, discussions and case studies 3 X 50</p>		<p><b>Material:</b> Input Output Analysis</p> <p><b>References:</b> <i>Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.</i></p> <hr/> <p><b>Material:</b> Technology Matrix, Input output analysis exercise</p> <p><b>Reference:</b> <i>Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.</i></p>	3%
13	<p>1. Students are able to understand and apply linear programming</p> <p>2. Students are able to understand and apply the basic ideas of linear programming</p> <p>3. Students are able to understand and apply the general form of linear programming models</p>	<p>1. Explain and analyze linear programming</p> <p>2. Explain and analyze the basic ideas of linear programming</p> <p>3. Explain and analyze the general form of linear programming models</p>	<p><b>Criteria:</b> 1. Every contribution is appreciated 2. According to scoring guidelines</p> <p><b>Form of Assessment :</b> Participatory Activities</p>	<p>Interactive lectures, discussions and case studies 3 X 50</p>		<p><b>Material:</b> Linear Programming</p> <p><b>References:</b> <i>Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.</i></p>	3%

14	1. Students are able to understand and apply linear programming graphic methods 2. Students are able to understand and apply linear algebraic programming methods	1. Explain and analyze graphic method linear programming 2. Explain and analyze linear programming algebraic methods	<b>Criteria:</b> According to scoring guidelines  <b>Form of Assessment :</b> Participatory Activities	Interactive lectures, discussions and case studies 3 X 50		<b>Material:</b> Linear Programming <b>References:</b> <i>Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.</i>	4%
15	1. Students are able to understand and apply simplex method linear programming 2. Students are able to understand and apply artificial variables and minimization problems 3. Explain and analyze linear programming exercises	1. Explain and analyze simplex method linear programming 2. Explain and analyze artificial variables and minimization problems 3. Explain and analyze linear programming exercises	<b>Criteria:</b> 1. Every contribution is appreciated 2. According to scoring guidelines  <b>Form of Assessment :</b> Participatory Activities	Interactive lectures, discussions and case studies 3 X 50		<b>Material:</b> Linear Programming <b>References:</b> <i>Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.</i>	3%
16	UAS	Can do questions well and correctly	<b>Criteria:</b> According to scoring guidelines  <b>Form of Assessment :</b> Test	Written test 3 X 50		<b>Material:</b> Material 9-15 <b>References:</b> <i>Dumairy (2010), Applied Mathematics for Business and Economics, BPFE, Yogyakarta.</i>	30%

#### Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	50%
2.	Test	50%
		100%

#### Notes

- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- Forms of assessment:** test and non-test.
- 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.
- 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.
- Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
- 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%.
- TM=Face to face, PT=Structured assignments, BM=Independent study.

