



Universitas Negeri Surabaya
Faculty of Engineering,
Building Engineering Education Undergraduate Study
Program

Document
Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date																																																																																						
Analysis of Certain Static Structures	8320503003	Compulsory Study Program Subjects	T=3	P=0	ECTS=4.77	1	August 10, 2022																																																																																						
AUTHORIZATION	SP Developer		Course Cluster Coordinator			Study Program Coordinator																																																																																							
	Suprpto, S.Pd., M.T.; Meity Wulandari, S.T., M.T.		-			Dr. Gde Agus Yudha Prawira Adistana, S.T., M.T.																																																																																							
Learning model	Project Based Learning																																																																																												
Program Learning Outcomes (PLO)	PLO study program which is charged to the course																																																																																												
	Program Objectives (PO)																																																																																												
	PO - 1	Students are able to calculate forces, reactions and moments and are able to draw shear force fields, normal force fields and moment fields																																																																																											
	PO - 2	Students are able to master knowledge of basic ideas, concepts, examples, techniques and methods for calculating forces, reactions and moments and are able to draw shear force planes, normal force planes and moment planes																																																																																											
	PO - 3	Students are able to apply accuracy in calculating forces, reactions and moments and are able to draw shear force planes, normal force planes and moment planes																																																																																											
	PLO-PO Matrix																																																																																												
		<table border="1" style="margin: auto;"> <tr><td style="text-align: center;">P.O</td></tr> <tr><td style="text-align: center;">PO-1</td></tr> <tr><td style="text-align: center;">PO-2</td></tr> <tr><td style="text-align: center;">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" style="text-align: center;">P.O</th> <th colspan="16" style="text-align: center;">Week</th> </tr> <tr> <th style="text-align: center;">1</th> <th style="text-align: center;">2</th> <th style="text-align: center;">3</th> <th style="text-align: center;">4</th> <th style="text-align: center;">5</th> <th style="text-align: center;">6</th> <th style="text-align: center;">7</th> <th style="text-align: center;">8</th> <th style="text-align: center;">9</th> <th style="text-align: center;">10</th> <th style="text-align: center;">11</th> <th style="text-align: center;">12</th> <th style="text-align: center;">13</th> <th style="text-align: center;">14</th> <th style="text-align: center;">15</th> <th style="text-align: center;">16</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">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><td></td> </tr> <tr> <td style="text-align: center;">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><td></td> </tr> <tr> <td style="text-align: center;">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><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	This course teaches basic principles in the field of civil engineering because this course will support subsequent courses. This course teaches about the types of loads that work, the types of supports used, the principles of balance equations, and methods for completing structural analysis both analytically and graphically. This course teaches the calculation of support reactions and drawing MDN planes which describe the internal forces of a structural element. These calculations are carried out on simple girder structures, cantilevered girder structures, indirect structures, gerber structures, gerber portals, portals with simple supports, and on frame systems.																																																																																												
References	Main :																																																																																												

1	Getting to know: Forces and vectors, drawing units of force and length, adding forces (resultante), describing forces.	Explaining: Forces and vectors, drawing units of force and length, adding forces (resultante), describing forces.	<p>Criteria: According to the rubric</p> <p>Form of Assessment : Participatory Activities</p>	Lectures, discussions and questions and answers 3 X 50		<p>Material: Forces and vectors, drawing force and length units, summing forces (resultante), describing forces.</p> <p>References: <i>Darmali, Arief and Ichwan. 1979. Civil Force Science. Jakarta: Department of Education and Culture.[2].</i></p> <hr/> <p>Material: Forces and vectors, drawing force and length units, summing forces (resultante), describing forces.</p> <p>References: <i>Hibbeler, R C. 2012. Structural Analysis. New Jersey: Pearson Education Inc. [3].</i></p> <hr/> <p>Material: Forces and vectors, drawing force and length units, summing forces (resultante), describing forces.</p> <p>Reference: <i>Karyoto. 2014. Analysis of Certain Static Structures. Unesa.</i></p> <hr/> <p>Material: Forces and vectors, drawing force and length units, summing forces (resultante), describing forces.</p> <p>Bibliography: <i>Williams, Alan. 2009. Structural Analysis: In Theory and Practice. Burlington: Elsevier.</i></p>	10%
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2	Able to analyze two-support beams, cantilevers, draw D,N,M planes.	Explaining the various types of supports and their properties, analysis of two-supported beams, cantilevers, drawing the D,N,M planes.	<p>Criteria: According to the rubric</p> <p>Form of Assessment : Participatory Activities</p>	Lectures, discussions, questions and answers and individual assignments 3 X 50		<p>Material: Types of supports and their properties, Analysis of two-support beams, cantilevers, drawing D,N,M planes. References: <i>Darmali, Arief and Ichwan. 1979. Civil Force Science. Jakarta: Department of Education and Culture.[2].</i></p> <hr/> <p>Material: Types of supports and their properties, Analysis of two-support beams, cantilevers, drawing D,N,M planes. References: <i>Hibbeler, R C. 2012. Structural Analysis. New Jersey: Pearson Education Inc. [3].</i></p> <hr/> <p>Material: Types of supports and their properties, Analysis of two-support beams, cantilevers, drawing D,N,M planes. Reference: <i>Karyoto. 2014. Analysis of Certain Static Structures. Unesa.</i></p> <hr/> <p>Material: Types of supports and their properties, Analysis of two-support beams, cantilevers, drawing D,N,M planes. Bibliography: <i>Williams, Alan. 2009. Structural Analysis: In Theory and Practice. Burlington: Elsevier.</i></p>	5%
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3	Able to analyze two-support beams, cantilevers, draw D,N,M planes.	Explaining the various types of supports and their properties, analysis of two-supported beams, cantilevers, drawing the D,N,M planes.	<p>Criteria: According to the rubric</p> <p>Form of Assessment : Participatory Activities</p>	Lectures, discussions, questions and answers and individual assignments 3 X 50		<p>Material: Types of supports and their properties, Analysis of two-support beams, cantilevers, drawing D,N,M planes. References: <i>Darmali, Arief and Ichwan. 1979. Civil Force Science. Jakarta: Department of Education and Culture.[2].</i></p> <hr/> <p>Material: Types of supports and their properties, Analysis of two-support beams, cantilevers, drawing D,N,M planes. References: <i>Hibbeler, R C. 2012. Structural Analysis. New Jersey: Pearson Education Inc. [3].</i></p> <hr/> <p>Material: Types of supports and their properties, Analysis of two-support beams, cantilevers, drawing D,N,M planes. Reference: <i>Karyoto. 2014. Analysis of Certain Static Structures. Unesa.</i></p> <hr/> <p>Material: Types of supports and their properties, Analysis of two-support beams, cantilevers, drawing D,N,M planes. Bibliography: <i>Williams, Alan. 2009. Structural Analysis: In Theory and Practice. Burlington: Elsevier.</i></p>	5%
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4	Able to analyze two-support beams, cantilevers, draw D,N,M planes.	Explaining the various types of supports and their properties, analysis of two-supported beams, cantilevers, drawing the D,N,M planes.	<p>Criteria: Full if the calculation answers are sequential and correct.</p> <p>Form of Assessment : Participatory Activities, Tests</p>	Lectures, discussions, questions and answers and individual assignments 3 X 50	<p>Material: Types of supports and their properties, Analysis of two-support beams, cantilevers, drawing D,N,M planes. References: <i>Darmali, Arief and Ichwan. 1979. Civil Force Science. Jakarta: Department of Education and Culture.[2].</i></p> <hr/> <p>Material: Types of supports and their properties, Analysis of two-support beams, cantilevers, drawing D,N,M planes. References: <i>Hibbeler, R C. 2012. Structural Analysis. New Jersey: Pearson Education Inc. [3].</i></p> <hr/> <p>Material: Types of supports and their properties, Analysis of two-support beams, cantilevers, drawing D,N,M planes. Reference: <i>Karyoto. 2014. Analysis of Certain Static Structures. Unesa.</i></p> <hr/> <p>Material: Types of supports and their properties, Analysis of two-support beams, cantilevers, drawing D,N,M planes. Bibliography: <i>Williams, Alan. 2009. Structural Analysis: In Theory and Practice. Burlington: Elsevier.</i></p>	10%
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5	Able to analyze beams with indirect loads and Gerber beams	Explains how to analyze beams with indirect loads and Gerber beams	<p>Criteria: According to the rubric</p> <p>Form of Assessment : Participatory Activities</p>	Lectures, discussions, questions and answers and individual assignments 3 X 50		<p>Material: Analysis of beams with indirect loads and Gerber beams</p> <p>References: <i>Darmali, Arief and Ichwan. 1979. Civil Force Science. Jakarta: Department of Education and Culture.[2].</i></p> <hr/> <p>Material: Analysis of beams with indirect loads and Gerber beams</p> <p>Reference: <i>Hibbeler, R C. 2012. Structural Analysis. New Jersey: Pearson Education Inc. [3].</i></p> <hr/> <p>Material: Analysis of beams with indirect loads and Gerber beams</p> <p>Reference: <i>Karyoto. 2014. Analysis of Certain Static Structures. Unesa.</i></p> <hr/> <p>Material: Analysis of beams with indirect loads and Gerber beams</p> <p>Reference: <i>Williams, Alan. 2009. Structural Analysis: In Theory and Practice. Burlington: Elsevier.</i></p>	5%
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6	Able to analyze beams with indirect loads and Gerber beams	Explains how to analyze beams with indirect loads and Gerber beams	<p>Criteria: According to the rubric</p> <p>Form of Assessment : Participatory Activities</p>	Lectures, discussions, questions and answers and individual assignments 3 X 50		<p>Material: Analysis of beams with indirect loads and Gerber beams</p> <p>References: <i>Darmali, Arief and Ichwan. 1979. Civil Force Science. Jakarta: Department of Education and Culture.[2].</i></p> <hr/> <p>Material: Analysis of beams with indirect loads and Gerber beams</p> <p>Reference: <i>Hibbeler, R C. 2012. Structural Analysis. New Jersey: Pearson Education Inc. [3].</i></p> <hr/> <p>Material: Analysis of beams with indirect loads and Gerber beams</p> <p>Reference: <i>Karyoto. 2014. Analysis of Certain Static Structures. Unesa.</i></p> <hr/> <p>Material: Analysis of beams with indirect loads and Gerber beams</p> <p>Reference: <i>Williams, Alan. 2009. Structural Analysis: In Theory and Practice. Burlington: Elsevier.</i></p>	5%
7	Able to analyze beams with indirect loads, Gerber beams	Explains how to analyze structures with three-joint supports	<p>Criteria: According to the rubric</p> <p>Form of Assessment : Participatory Activities</p>	Lectures, discussions, questions and answers and individual assignments 3 X 50			10%
8	Master ASTT material from meetings 1 - 8 by taking the mid-semester exam (UTS)		<p>Criteria:</p> <p>Form of Assessment : Participatory Activities</p>	3 X 50			0%

9	Able to analyze beams due to moving loads with lines of influence	Explains how to analyze beams due to moving loads with lines of influence	Criteria: According to the rubric Form of Assessment : Participatory Activities	Lectures, discussions and questions and answers 3 X 50		Material: Analysis of beams caused by moving loads with lines of influence. Reference: <i>Hibbeler, R C. 2012. Structural Analysis. New Jersey: Pearson Education Inc. [3].</i> <hr/> Material: Analysis of beams caused by moving loads using lines of influence. Reference: <i>Karyoto. 2014. Analysis of Certain Static Structures. Unesa.</i> <hr/> Material: Analysis of beams caused by moving loads using lines of influence. Reference: <i>Williams, Alan. 2009. Structural Analysis: In Theory and Practice. Burlington: Elsevier.</i>	5%
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10	Able to analyze beams due to moving loads with lines of influence	Explains how to analyze beams due to moving loads with lines of influence	<p>Criteria: According to the rubric</p> <p>Form of Assessment : Participatory Activities</p>	Lectures, discussions, questions and answers, and individual assignments 3 X 50		<p>Material: Analysis of beams caused by moving loads with lines of influence. Reference: <i>Hibbeler, R C. 2012. Structural Analysis. New Jersey: Pearson Education Inc. [3].</i></p> <hr/> <p>Material: Analysis of beams caused by moving loads using lines of influence. Reference: <i>Karyoto. 2014. Analysis of Certain Static Structures. Unesa.</i></p> <hr/> <p>Material: Analysis of beams caused by moving loads using lines of influence. Reference: <i>Williams, Alan. 2009. Structural Analysis: In Theory and Practice. Burlington: Elsevier.</i></p>	5%
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11	Able to calculate the forces on the frame using the Cremona method	Explains how to calculate forces on a frame using the Cremona method.	Criteria: According to the rubric Form of Assessment : Participatory Activities	Lectures, discussions and questions and answers 3 X 50		Material: Forces on the framework using the Cremona method. Reference: <i>Hibbeler, R C. 2012. Structural Analysis. New Jersey: Pearson Education Inc. [3].</i> <hr/> Material: Style on the framework using the Cremona method. Library: <i>Karyoto. 2014. Analysis of Certain Static Structures. Unesa.</i> <hr/> Material: Forces on the framework using the Cremona method References: <i>Williams, Alan. 2009. Structural Analysis: In Theory and Practice. Burlington: Elsevier.</i>	10%
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12	Able to calculate the forces on the frame using the Balance method and Ritter method	Explain how to calculate forces on a frame using the balance method and Ritter method	<p>Criteria: According to the rubric</p> <p>Form of Assessment : Participatory Activities</p>	Lectures, discussions and questions and answers. 3 X 50		<p>Material: Forces on the framework using the Balance method and Ritter method</p> <p>References: <i>Hibbeler, R C. 2012. Structural Analysis. New Jersey: Pearson Education Inc. [3].</i></p> <hr/> <p>Material: Forces on the skeleton using the Balance method and Ritter method</p> <p>Library: <i>Karyoto. 2014. Analysis of Certain Static Structures. Unesa.</i></p> <hr/> <p>Material: Forces on the frame using the Balance method and Ritter method</p> <p>References: <i>Williams, Alan. 2009. Structural Analysis: In Theory and Practice. Burlington: Elsevier.</i></p>	5%
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13	Able to calculate the forces on the frame using the Balance method and Ritter method	Explain how to calculate forces on a frame using the balance method and Ritter method	<p>Criteria: According to the rubric</p> <p>Form of Assessment : Participatory Activities</p>	Lectures, discussions and questions and answers. 3 X 50		<p>Material: Forces on the framework using the Balance method and Ritter method</p> <p>References: <i>Hibbeler, R C. 2012. Structural Analysis. New Jersey: Pearson Education Inc. [3].</i></p> <hr/> <p>Material: Forces on the skeleton using the Balance method and Ritter method</p> <p>Library: <i>Karyoto. 2014. Analysis of Certain Static Structures. Unesa.</i></p> <hr/> <p>Material: Forces on the frame using the Balance method and Ritter method</p> <p>References: <i>Williams, Alan. 2009. Structural Analysis: In Theory and Practice. Burlington: Elsevier.</i></p>	10%
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14	Able to calculate the force on the frame due to the load moving with the line of influence	Explain how to calculate the force on a frame due to a load moving with a line of influence	Criteria: According to the rubric Form of Assessment : Participatory Activities	Lectures, discussions and questions and answers. 3 X 50		Material: Force on the frame due to moving loads with lines of influence References: <i>Hibbeler, R C. 2012. Structural Analysis. New Jersey: Pearson Education Inc. [3].</i> <hr/> Material: Forces on the frame due to loads moving with lines of influence. Reference: <i>Karyoto. 2014. Analysis of Certain Static Structures. Unesa.</i> <hr/> Material: Force on the frame due to loads moving with lines of influence References: <i>Williams, Alan. 2009. Structural Analysis: In Theory and Practice. Burlington: Elsevier.</i>	5%
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15	Able to calculate the force on the frame due to the load moving with the line of influence	Explain how to calculate the force on a frame due to a load moving with a line of influence	Criteria: According to the rubric Form of Assessment : Participatory Activities	Lectures, discussions, questions and answers, and individual assignments 3 X 50		Material: Force on the frame due to moving loads with lines of influence References: <i>Hibbeler, R C. 2012. Structural Analysis. New Jersey: Pearson Education Inc. [3].</i> <hr/> Material: Forces on the frame due to loads moving with lines of influence. Reference: <i>Karyoto. 2014. Analysis of Certain Static Structures. Unesa.</i> <hr/> Material: Force on the frame due to loads moving with lines of influence References: <i>Williams, Alan. 2009. Structural Analysis: In Theory and Practice. Burlington: Elsevier.</i>	10%
16							0%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	95%
2.	Test	5%
		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.

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.