



**Universitas Negeri Surabaya
Faculty of Engineering
Civil Engineering Undergraduate Study Program**

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date																																																																																																				
Analysis of Certain Static Structures	2220103004	Compulsory Study Program Subjects	T=3	P=0	ECTS=4.77	1	April 28, 2023																																																																																																				
AUTHORIZATION		SP Developer	Course Cluster Coordinator			Study Program Coordinator																																																																																																					
		Dr. Ir. Bambang Sabariman, ST., MT.	Dr. Ir. Bambang Sabariman, ST., MT.			Yogie Risdianto, 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	Students are able to analyze internal forces in the form of: M (moment), N (normal force), D (shear force) SST.																																																																																																									
	PO - 2	Students are able to apply the results of MND analysis to the analysis of deflection, rotation and SST stress.																																																																																																									
	PO - 3	Students are able to explain the origin of the load and its distribution on the SST.																																																																																																									
	PO - 4	Students are able to simply apply the results of the M, N, D analysis to an introduction to SST design.																																																																																																									
	PLO-PO Matrix																																																																																																										
		<table border="1" style="margin-left: 20px; border-collapse: collapse;"> <tr><td>P.O</td></tr> <tr><td>PO-1</td></tr> <tr><td>PO-2</td></tr> <tr><td>PO-3</td></tr> <tr><td>PO-4</td></tr> </table>						P.O	PO-1	PO-2	PO-3	PO-4																																																																																															
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PO Matrix at the end of each learning stage (Sub-PO)																																																																																																											
	<table border="1" style="margin-left: 20px; border-collapse: collapse;"> <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> <tr><td>PO-4</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																	PO-4																
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Short Course Description	1). 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 also analyzes support reactions and draws the M, D, N planes which describe the internal forces of a particular static structural element (SST). Analysis was carried out on simple girder structures, cantilevered girder structures, indirect structures, gerber structures, three-joint portals, portals with simple supports, and on frame systems. Followed by calculations of deflection, rotation of simple beams and trusses as well as certain static structural stresses. 2). Learning is carried out using the Case Study Method and ends with discussion activities.																																																																																																										
References	Main :																																																																																																										
	<ol style="list-style-type: none"> 1. Darmali, Arief dan Ichwan. 1979. Ilmu Gaya Sipel. Jakarta: Depdikbud. 2. Hibbeler, R C. 2012. Structural Analysis. New Jersey: Pearson Education Inc. 3. Karyoto. 2014. Analisis Struktur Statis Tertentu. Unesa. 4. Williams, Alan. 2009. Structural Analysis: In Theory and Practice. Burlington: Elsevier. 5. Sabariman, Bambang. 2020. Hand out Struktur Statis Tertentu. Surabaya: JTS. 																																																																																																										
Supporters:																																																																																																											
	<ol style="list-style-type: none"> 1. Popov, E.P. 1993. Mechanics of Materials, 2nd Edition (SI Version), penterjemah Zainul Astamar. Jakarta: Erlangga. 2. Sunggono. 1984. Buku Teknik Sipil. Jakarta: Penerbit Nova. 3. Tjokrodiharjo, Sutojo. 1998. Analisis Struktur I. Yogyakarta: Biro Penerbit Kagama Teknik Sipil UGM 4. Pelatihan Percepatan Penyelesaian Soal Mekanika Teknik (Mektek) Bagi Guru dan Siswa Kelas X SMKN 1 Sidoarjo 																																																																																																										
Supporting lecturer	Dr. Ir. Bambang Sabariman, S.T., M.T. Mochamad Firmansyah Sofianto, S.T., M.Sc., M.T. Meity Wulandari, S.T., M.T.																																																																																																										

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 are able to explain the meaning of construction/structure and certain static structural systems (SST), Students are able to explain the meaning of forces and vectors, break down forces and the sum of forces (resultante). Students are able to explain the units used in SST analysis.	<ol style="list-style-type: none"> 1.Explain the meaning of construction/structure and certain static structural systems (SST). 2.Explaining the meaning of force and vector, breaking down force and the sum of forces (resultante). 3.Explain the units used in SST analysis. 	<p>Criteria: If the analysis of the completion of the SST case study and its stages is correct, score 100.</p> <p>Form of Assessment : Participatory Activities, Portfolio Assessment</p>	Lectures, discussions, question and answer practice (case study) SST. 3 X 50 minutes	Lectures, discussions, question and answer practice (case study) SST. 3 X 50 minutes	<p>Material: Discussion of the meaning of construction/structure and certain static structural systems (SST), understanding forces and vectors, analyzing forces and the sum of forces (resultante), use of units used in SST analysis.</p> <p>Bibliography: <i>Sabariman, Bambang. 2020. Hand out of Certain Static Structures. Surabaya: JTS.</i></p> <p>Material: Accelerated solving of engineering mechanics questions Library: <i>Accelerated Training in Solving Engineering Mechanics Questions (Mektek) for Class X Teachers and Students at SMKN 1 Sidoarjo</i></p>	5%
2	Students are able to explain the meaning of construction/structure and certain static structural systems (SST), Students are able to explain the meaning of forces and vectors, break down forces and the sum of forces (resultante). Students are able to explain the units used in SST analysis.	<ol style="list-style-type: none"> 1.Explain the meaning of construction/structure and certain static structural systems (SST). 2.Explaining the meaning of force and vector, breaking down force and the sum of forces (resultante). 3.Explain the units used in SST analysis. 	<p>Criteria: If the analysis of the completion of the SST case study and its stages is correct, score 100.</p> <p>Form of Assessment : Participatory Activities, Tests</p>	Lectures, discussions, question and answer practice (case study) SST. 3 X 50 minutes	Lectures, discussions, question and answer practice (case study) SST. 3 X 50 minutes	<p>Material: Discussion of the meaning of construction/structure and certain static structural systems (SST), understanding forces and vectors, analyzing forces and the sum of forces (resultante), use of units used in SST analysis.</p> <p>Bibliography: <i>Sabariman, Bambang. 2020. Hand out of Certain Static Structures. Surabaya: JTS.</i></p>	6%
3	Able to analyze D, N, M two-support beams, cantilevers, draw D, N, M planes.	<ol style="list-style-type: none"> 1.Explain the various types of two-support simple beam supports and their properties 2.Analysis of a simple beam (simple beam) with two supports, cantilever, and drawing the D,N,M plane. 	<p>Criteria: If the analysis of the completion of the SST case study and its stages is correct, score 100.</p> <p>Form of Assessment : Participatory Activities</p>	Lectures, discussions, question and answer exercises (case studies) on certain static structures (SST). 3x50 minutes	Lectures, discussions, question and answer exercises (case studies) on certain static structures (SST). 3x50 minutes	<p>Material: Analysis of a simple beam with two supports, cantilever, and drawing the D,N,M plane.</p> <p>Bibliography: <i>Sabariman, Bambang. 2020. Hand out of Certain Static Structures. Surabaya: JTS.</i></p>	6%
4	Able to analyze D, N, M two-support beams, cantilevers, draw D, N, M planes.	<ol style="list-style-type: none"> 1.Explain the various types of two-support simple beam supports and their properties 2.Analysis of a simple beam (simple beam) with two supports, cantilever, and drawing the D,N,M plane. 	<p>Criteria: If the analysis of the completion of the SST case study and its stages is correct, score 100.</p> <p>Form of Assessment : Participatory Activities</p>	Lectures, discussions, question and answer exercises (case studies) on certain static structures (SST). 3X50 minutes	Lectures, discussions, question and answer exercises (case studies) on certain static structures (SST). 3x50 minutes	<p>Material: Analysis of a simple beam with two supports, cantilever, and drawing the D,N,M plane.</p> <p>Bibliography: <i>Sabariman, Bambang. 2020. Hand out of Certain Static Structures. Surabaya: JTS.</i></p>	6%
5	Able to analyze D, N, M two-support beams, cantilevers, draw D, N, M planes.	<ol style="list-style-type: none"> 1.Explain the various types of two-support simple beam supports and their properties 2.Analysis of a simple beam (simple beam) with two supports, cantilever, and drawing the D,N,M plane. 	<p>Criteria: If the analysis of the completion of the SST case study and its stages is correct, score 100.</p> <p>Form of Assessment : Participatory Activities, Tests</p>	Lectures, discussions, question and answer exercises (case studies) on certain static structures (SST). 3X50 minutes	Lectures, discussions, question and answer exercises (case studies) on certain static structures (SST). 3x50 minutes	<p>Material: Analysis of a simple beam with two supports, cantilever, and drawing the D,N,M plane.</p> <p>Bibliography: <i>Sabariman, Bambang. 2020. Hand out of Certain Static Structures. Surabaya: JTS.</i></p>	6%

6	Students are able to analyze D, N, M, D, N, M planes of continuous beams (Gerber) and SST three-joint portals.	<ol style="list-style-type: none"> 1.Explains the analysis of a certain static structure portal (SST) with two supports and its properties. 2.Explains the depiction of the D,N,M plane of a certain two-support static structure portal (SST). 	<p>Criteria: If the analysis of the completion of the specific static structure portal case study (SST) and its stages is correct, score 100.</p> <p>Form of Assessment : Participatory Activities, Tests</p>	Lectures, discussions, questions and answers on exercises (case studies) on jointed beams (Gerber) and three-joint SST portals. 3X50 minutes	Lectures, discussions, questions and answers on exercises (case studies) on jointed beams (Gerber) and three-joint SST portals. 3x50 minutes	<p>Material: Analysis of continuous beams (Gerber) and three-joint SST portals.</p> <p>Bibliography: <i>Sabariman, Bambang. 2020. Hand out of Certain Static Structures. Surabaya: JTS.</i></p>	6%
7	Students are able to analyze D, N, M SST portals & draw D, N, M fields.	<ol style="list-style-type: none"> 1.Explains the analysis of a certain static structure portal (SST) with two supports and its properties. 2.Explains the depiction of the D,N,M plane of a certain two-support static structure portal (SST). 	<p>Criteria: If the analysis of the completion of the specific static structure portal case study (SST) and its stages is correct, score 100.</p> <p>Form of Assessment : Participatory Activities</p>	Lectures, discussions, question and answer exercises (case studies) on certain static structure portals (SST). 3X50 minutes	Lectures, discussions, question and answer exercises (case studies) on certain static structure portals (SST). 3x50 minutes	<p>Material: analysis of a specific static structure (SST) two-support portal and its properties.</p> <p>Bibliography: <i>Sabariman, Bambang. 2020. Hand out of Certain Static Structures. Surabaya: JTS.</i></p> <p>Material: Analysis of a certain static structure portal (SST) with two supports and its properties as well as depiction of the M, D, N planes.</p> <p>References: <i>Sabariman, Bambang. 2020. Hand out of Certain Static Structures. Surabaya: JTS.</i></p>	6%
8	Midterm Exam (UTS)	Explains how to analyze structures with three-joint supports	<p>Criteria: If the analysis of the completion of the SST case study and its stages is correct, score 100.</p> <p>Form of Assessment : Participatory Activities</p>	Completion of simple beam and SST portal case studies. 2x50 minutes	Completion of simple beam and SST portal case studies. 2x50 minutes	<p>Material: UTS completion of simple beam case study and SST portal.</p> <p>Bibliography: <i>Sabariman, Bambang. 2020. Hand out of Certain Static Structures. Surabaya: JTS.</i></p>	0%
9	Able to analyze the influence lines of STT beams.	Complete UTS questions on time and get maximum marks	<p>Form of Assessment : Participatory Activities</p>	Lectures, discussions, question and answer exercises (case studies) on certain static structures (SST). 3X50 minutes	Lectures, discussions, question and answer exercises (case studies) on certain static structures (SST). 3x50 minutes	<p>Material: Analyzing the influence lines of STT beams.</p> <p>Bibliography: <i>Sabariman, Bambang. 2020. Hand out of Certain Static Structures. Surabaya: JTS.</i></p>	8%
10	Able to analyze truss styles using the Cremona method.	Explain how to analyze truss forces using the Cremona method.	<p>Criteria: If the analysis of the completion of the SST truss case study and its stages is correct, score 100.</p> <p>Form of Assessment : Participatory Activities, Portfolio Assessment</p>	Lectures, discussions, question and answer exercises (case studies) on certain static structures (SST). 3X50 minutes	Lectures, discussions, question and answer exercises (case studies) on certain static structures (SST). 3x50 minutes	<p>Material: Analysis of truss forces using the Cremona method.</p> <p>Bibliography: <i>Sabariman, Bambang. 2020. Hand out of Certain Static Structures. Surabaya: JTS.</i></p>	8%
11	Able to analyze truss styles using the Cremona method.	Explain how to analyze truss forces using the Cremona method.	<p>Criteria: If the analysis of the completion of the SST truss case study and its stages is correct, score 100.</p> <p>Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment</p>	Lectures, discussions, question and answer exercises (case studies) on certain static structures (SST). 3X50 minutes	Lectures, discussions, question and answer exercises (case studies) on certain static structures (SST). 3x50 minutes	<p>Material: Analysis of truss forces using the Cremona method.</p> <p>Bibliography: <i>Sabariman, Bambang. 2020. Hand out of Certain Static Structures. Surabaya: JTS.</i></p>	8%

12	Able to analyze truss forces using the Point Knot Balance (KTB) method.	Explains how to analyze truss forces using the Gusset Point Balance (KTB) method.	Criteria: If the analysis of the completion of the SST truss case study and its stages is correct, score 100. Forms of Assessment : Participatory Activities, Portfolio Assessment, Practical / Performance, Tests	Lectures, discussions, question and answer exercises (case studies) on certain static structures (SST). 3x50 minutes	Lectures, discussions, question and answer exercises (case studies) on certain static structures (SST). 3x50 minutes	Material: Analysis of truss forces using the Gusset Point Balance (KTB) method. Bibliography: <i>Sabariman, Bambang. 2020. Hand out of Certain Static Structures. Surabaya: JTS.</i>	8%
13	Able to analyze truss forces using the Ritter method.	Explain how to analyze truss forces using the Ritter method.	Criteria: If the analysis of the SST truss case study and its stages is correct, score 100. Form of Assessment : Participatory Activities	Lectures, discussions, question and answer exercises (case studies) on certain static structures (SST). 3x50 minutes	Lectures, discussions, question and answer exercises (case studies) on certain static structures (SST). 3x50 minutes	Material: Analysis of truss forces using the Ritter method. Bibliography: <i>Sabariman, Bambang. 2020. Hand out of Certain Static Structures. Surabaya: JTS.</i>	8%
14	Students are able to analyze the deflection & rotation of simple beams and trusses	Explains the analysis of deflection & rotation of simple beams and trusses.	Criteria: If the analysis of the completion of the SST case study and its stages is correct, score 100. Form of Assessment : Participatory Activities	Lectures, discussions, question and answer exercises (case studies) on certain static structures (SST). 3x50 minutes	Lectures, discussions, question and answer exercises (case studies) on certain static structures (SST). 3x50 minutes	Material: Deflection & rotation analysis of simple beams and trusses. Bibliography: <i>Sabariman, Bambang. 2020. Hand out of Certain Static Structures. Surabaya: JTS.</i>	8%
15	Students are able to analyze the deflection & rotation of simple beams and trusses	Explains the analysis of deflection & rotation of simple beams and trusses.	Criteria: If the analysis of the completion of the SST case study and its stages is correct, score 100. Form of Assessment : Participatory Activities, Tests	Lectures, discussions, question and answer exercises (case studies) on certain static structures (SST). 3x50 minutes	Lectures, discussions, question and answer exercises (case studies) on certain static structures (SST). 3x50 minutes	Material: Deflection & rotation analysis of simple beams and trusses. Bibliography: <i>Sabariman, Bambang. 2020. Hand out of Certain Static Structures. Surabaya: JTS.</i>	10%
16	Final Semester Exam (UAS) calculation of deflection, rotation & stress of certain static structures (SST).	Explains the calculation of deflection, rotation & stress of certain static structures (SST).	Criteria: If the input for deflection, rotation & stress analysis is correct, the score is 40, if the deflection analysis is correct, the score is 20, if the rotation analysis is correct, the score is 20, if the stress analysis is correct, the score is 20. Form of Assessment : Participatory Activities	Completion of a case study of deflection and rotation of certain static structures (SST). 2x50 minutes	Completion of a case study of deflection and rotation of certain static structures (SST). 2x50 minutes	Material: UAS analysis of selection, rotation and tension. Bibliography: <i>Sabariman, Bambang. 2020. Hand out of Certain Static Structures. Surabaya: JTS.</i>	0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	67.17%
2.	Project Results Assessment / Product Assessment	2.67%
3.	Portfolio Assessment	11.17%
4.	Practice / Performance	2%
5.	Test	16%
		99.01%

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.