



**Universitas Negeri Surabaya
Vocational Faculty,
D4 Civil Engineering Study Program**

**Document
Code**

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
TALL BUILDING STRUCTURES	2230502044	Structure	T=2	P=0	ECTS=3.18	5	April 28, 2023
AUTHORIZATION	SP Developer		Course Cluster Coordinator			Study Program Coordinator	
	Feriza Nadiar, S.T., M.T.				Puguh Novi Prasetyono, S.Pd., M.T.	

Learning model	Case Studies
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Program Learning Outcomes (PLO)	PLO study program which is charged to the course
	Program Objectives (PO)

PO - 1	Students have the ability to carry out evaluations on high-rise steel structures in accordance with SNI-03-1729-2002.
PO - 2	Students have knowledge of the theory of evaluation of lateral support frame systems and the loads acting on steel structures of tall buildings.
PO - 3	Students are able to design and select the right lateral support frame system for a building according to the type of building and the load zone acting on the building.
PO - 4	Students have a responsible attitude in developing skills in designing steel structures in accordance with the Indonesian National Standard SNI-03-1729-2002, especially for tall buildings.

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> <tr><td>PO-4</td></tr> </table>	P.O	PO-1	PO-2	PO-3	PO-4
P.O						
PO-1						
PO-2						
PO-3						
PO-4						

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> <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	Conduct studies and provide an understanding of tall buildings using steel structures, the influence of working lateral loads in the form of wind loads and earthquake loads on building structures in accordance with the building zone, the lateral supporting steel frame system used in accordance with the maximum height of the building and the load zone, and the use of computer applications in planning and evaluating lateral support steel frame systems.
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References	Main :

1. Departemen Pekerjaan Umum. 2002.SNI-03-1729-2002 Tata Cara Perencanaan Struktur Baja untuk Bangunan Gedung. Jakarta.
2. Badan Standadisasi Nasional. 2012. SNI 1726:2012 Tata Cara Perencanaan Ketahanan Gempa untuk Struktur Bangunan Gedung dan Non Gedung. Jakarta.
3. Badan Standadisasi Nasional. 2013. SNI 1727:2013 Beban Minimum untuk Perencanaan Bangunan Gedung dan Struktur Lain. Jakarta.
4. Wolfgang Schueller. 2001. Struktur Bangunan Bertingkat Tinggi. Bandung: Refika Aditama.
5. Jason A Cook. 2005. Structural Steel Framing Options for Mid and High Rise Buildings. Massachusetts Institute of Technology.
6. Pramono. 2006. Buku latihan Aplikasi Rekayasa Konstruksi". Jakarta : PT Elexmedia Komputindo.

Supporters:

Supporting lecturer

Arik Triarso, S.Pd., M.T.
 Feriza Nadiar, S.T., M.T.
 Berkat Cipta Zega, S.Pd., M.Eng.
 Irfan Prasetyo Loekito, S.T., M.Sc.

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	Able to understand the concept and meaning of tall building steel structures	1.Explain the meaning of tall building structures 2.Explain the use of steel structures in tall buildings	Criteria: Full marks if the answer is complete, clear and in accordance with theory Form of Assessment : Participatory Activities		Lectures, discussions, questions and answers, and presentations 2 x 50 minutes	Material: Basic Structures of Tall Buildings Reader: Wolfgang Schueller. 2001. High-Rise Building Structures. Bandung: Refika Aditama. Material: Steel structures in high and medium rise buildings Reader: Jason A Cook. 2005. Structural Steel Framing Options for Mid and High Rise Buildings. Massachusetts Institute of Technology.	4%

2	Able to understand and calculate earthquake lateral forces acting on steel structures of tall buildings	<ol style="list-style-type: none"> 1.Explain the meaning of lateral loads due to earthquakes and earthquake zones 2.Explain the calculation of earthquake loads 3.Explain the application of earthquake loads to steel structures of tall buildings 	<p>Criteria: Full marks if the answer is complete, clear and in accordance with theory</p> <p>Form of Assessment : Participatory Activities</p>	Lectures, discussions, questions and answers, and presentations 2 x 50 minutes		<p>Material: Earthquake resistance planning for buildings and non-buildings</p> <p>Reference: <i>National Standardization Agency. 2012. SNI 1726:2012 Procedures for Earthquake Resistance Planning for Building and Non-Building Structures. Jakarta.</i></p> <hr/> <p>Material: Standard load</p> <p>Reference: <i>National Standardization Agency. 2013. SNI 1727:2013 Minimum Loads for Planning Buildings and Other Structures. Jakarta.</i></p> <hr/> <p>Material: Basic Structures of Tall Buildings</p> <p>Reader: <i>Wolfgang Schueller. 2001. High-Rise Building Structures. Bandung: Refika Aditama.</i></p> <hr/> <p>Material: Steel structures in high and medium rise buildings</p> <p>Reader: Jason A Cook. 2005. <i>Structural Steel Framing Options for Mid and High Rise Buildings. Massachusetts Institute of Technology.</i></p>	4%
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3	Able to understand and calculate the lateral wind forces that act on steel structures of tall buildings	<ol style="list-style-type: none"> 1.Explain the meaning of lateral loads due to wind 2.Explain the calculation of wind loads 3.Explain the application of wind loads to steel structures of tall buildings 	<p>Criteria: Full marks if the answer is complete, clear and in accordance with theory</p> <p>Form of Assessment : Participatory Activities</p>	Lectures, discussions, questions and answers, and presentations 2 x 50 minutes		<p>Material: Earthquake resistance planning for buildings and non-buildings</p> <p>Reference: <i>National Standardization Agency. 2012. SNI 1726:2012 Procedures for Earthquake Resistance Planning for Building and Non-Building Structures. Jakarta.</i></p> <hr/> <p>Material: Standard load</p> <p>Reference: <i>National Standardization Agency. 2013. SNI 1727:2013 Minimum Loads for Planning Buildings and Other Structures. Jakarta.</i></p> <hr/> <p>Material: Basic Structures of Tall Buildings</p> <p>Reader: <i>Wolfgang Schueller. 2001. High-Rise Building Structures. Bandung: Refika Aditama.</i></p> <hr/> <p>Material: Steel structures in high and medium rise buildings</p> <p>Reader: Jason A Cook. 2005. <i>Structural Steel Framing Options for Mid and High Rise Buildings. Massachusetts Institute of Technology.</i></p>	4%
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4	Able to identify and explain lateral support steel frame systems: - Rigid frame - Semirigid frame - Braced frame - rigid and braced frame outrigger and belt truss	<ol style="list-style-type: none"> 1.Explain the meaning of lateral supporting steel frames 2.Explain lateral support steel frame systems 3.Explain the behavior of lateral resisting steel frame systems 	<p>Criteria: Full marks if the answer is complete, clear and in accordance with theory</p> <p>Form of Assessment : Participatory Activities, Tests</p>	Lectures, discussions, questions and answers, and presentations 2 x 50 minutes		<p>Material: Steel structure planning standards Library: <i>Department of Public Works. 2002.SNI-03-1729-2002 Procedures for Planning Steel Structures for Buildings. Jakarta.</i></p> <hr/> <p>Material: Basic Structures of Tall Buildings Reader: <i>Wolfgang Schueller. 2001. High-Rise Building Structures. Bandung: Refika Aditama.</i></p> <hr/> <p>Material: Steel structures in high and medium rise buildings Reader: <i>Jason A Cook. 2005. Structural Steel FramingOptions for Mid and High Rise Buildings. Massachusetts Institute of Technology.</i></p>	5%
5	Able to identify and explain lateral support steel frame systems: - Rigid frame - Semirigid frame - Braced frame - rigid and braced frame outrigger and belt truss	<ol style="list-style-type: none"> 1.Explain the meaning of lateral supporting steel frames 2.Explain lateral support steel frame systems 3.Explain the behavior of lateral resisting steel frame systems 	<p>Criteria: Full marks if the answer is complete, clear and in accordance with theory</p> <p>Form of Assessment : Participatory Activities, Tests</p>	Lectures, discussions, questions and answers, and presentations 2 x 50 minutes		<p>Material: Steel structure planning standards Library: <i>Department of Public Works. 2002.SNI-03-1729-2002 Procedures for Planning Steel Structures for Buildings. Jakarta.</i></p> <hr/> <p>Material: Basic Structures of Tall Buildings Reader: <i>Wolfgang Schueller. 2001. High-Rise Building Structures. Bandung: Refika Aditama.</i></p> <hr/> <p>Material: Steel structures in high and medium rise buildings Reader: <i>Jason A Cook. 2005. Structural Steel FramingOptions for Mid and High Rise Buildings. Massachusetts Institute of Technology.</i></p>	5%

6	Able to identify and explain lateral support steel frame systems: - Rigid frame - Semirigid frame - Braced frame - rigid and braced frame outrigger and belt truss	1.Explain the meaning of lateral supporting steel frames 2.Explain lateral support steel frame systems 3.Explain the behavior of lateral resisting steel frame systems	Criteria: Full marks if the answer is complete, clear and in accordance with theory Form of Assessment : Participatory Activities, Tests	Lectures, discussions, questions and answers, and presentations 2 x 50 minutes		Material: Steel structure planning standards Library: <i>Department of Public Works. 2002.SNI-03-1729-2002 Procedures for Planning Steel Structures for Buildings. Jakarta.</i> Material: Basic Structures of Tall Buildings Reader: <i>Wolfgang Schueller. 2001. High-Rise Building Structures. Bandung: Refika Aditama.</i> Material: Steel structures in high and medium rise buildings Reader: Jason A Cook. 2005. <i>Structural Steel FramingOptions for Mid and High Rise Buildings. Massachusetts Institute of Technology.</i>	5%
7	Able to identify and explain lateral support steel frame systems: - Rigid frame - Semirigid frame - Braced frame - rigid and braced frame outrigger and belt truss	1.Explain the meaning of lateral supporting steel frames 2.Explain lateral support steel frame systems 3.Explain the behavior of lateral resisting steel frame systems	Criteria: Full marks if the answer is complete, clear and in accordance with theory Form of Assessment : Participatory Activities, Tests	Lectures, discussions, questions and answers, and presentations 2 x 50 minutes		Material: Steel structure planning standards Library: <i>Department of Public Works. 2002.SNI-03-1729-2002 Procedures for Planning Steel Structures for Buildings. Jakarta.</i> Material: Basic Structures of Tall Buildings Reader: <i>Wolfgang Schueller. 2001. High-Rise Building Structures. Bandung: Refika Aditama.</i> Material: Steel structures in high and medium rise buildings Reader: Jason A Cook. 2005. <i>Structural Steel FramingOptions for Mid and High Rise Buildings. Massachusetts Institute of Technology.</i>	5%
8	Master the material from meetings 1 - 7 by taking the midterm exam (UTS)	Can complete UTS on time and get maximum marks	Form of Assessment : Test	2 X 50			15%

9	Able to evaluate lateral support steel frame systems	Explain the evaluation steps for lateral support steel frame systems	<p>Criteria: Full marks if the answer is complete, clear and in accordance with theory</p> <p>Forms of Assessment : Participatory Activities, Practical Assessment, Tests</p>	Lectures, discussions, questions and answers, and presentations 2 X 50		<p>Material: Observing lateral support steel frame evaluation material</p> <p>Reference: <i>National Standardization Agency. 2012. SNI 1726:2012 Procedures for Earthquake Resistance Planning for Building and Non-Building Structures. Jakarta.</i></p> <hr/> <p>Material: Identifying evaluation steps for laterally supporting steel frame systems.</p> <p>Reference: <i>Department of Public Works. 2002.SNI-03-1729-2002 Procedures for Planning Steel Structures for Buildings. Jakarta.</i></p> <hr/> <p>Material: Discuss the evaluation of lateral supporting steel frames.</p> <p>Reference: <i>Department of Public Works. 2002.SNI-03-1729-2002 Procedures for Planning Steel Structures for Buildings. Jakarta.</i></p>	4%
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10	Able to evaluate lateral support steel frame systems	Explain the evaluation steps for lateral support steel frame systems	<p>Criteria: Full marks if the answer is complete, clear, in accordance with theory and correct</p> <p>Form of Assessment : Participatory Activities, Practice/Performance</p>	Lectures, discussions, questions and answers, and presentations 2 X 50		<p>Material: Observing the evaluation material for lateral supporting steel frames.</p> <p>Reference: <i>Wolfgang Schueller. 2001. High-Rise Building Structures. Bandung: Refika Aditama.</i></p> <hr/> <p>Material: Identifying evaluation steps for lateral support steel frame systems.</p> <p>Reference: <i>National Standardization Agency. 2013. SNI 1727:2013 Minimum Loads for Planning Buildings and Other Structures. Jakarta.</i></p> <hr/> <p>Material: Discuss the evaluation of lateral supporting steel frames.</p> <p>Reference: <i>Jason A Cook. 2005. Structural Steel Framing Options for Mid and High Rise Buildings. Massachusetts Institute of Technology.</i></p>	4%
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11	Able to evaluate lateral support steel frame systems	Explain the evaluation steps for lateral support steel frame systems	<p>Criteria: Full marks if the answer is complete, clear, in accordance with theory and correct</p> <p>Form of Assessment : Participatory Activities, Practice/Performance</p>	Lectures, discussions, questions and answers, and presentations 2 X 50		<p>Material: Observing the evaluation material for lateral supporting steel frames.</p> <p>Reference: <i>Wolfgang Schueller. 2001. High-Rise Building Structures. Bandung: Refika Aditama.</i></p> <hr/> <p>Material: Identifying evaluation steps for lateral support steel frame systems.</p> <p>Reference: <i>National Standardization Agency. 2013. SNI 1727:2013 Minimum Loads for Planning Buildings and Other Structures. Jakarta.</i></p> <hr/> <p>Material: Discuss the evaluation of lateral supporting steel frames.</p> <p>Reference: <i>Jason A Cook. 2005. Structural Steel Framing Options for Mid and High Rise Buildings. Massachusetts Institute of Technology.</i></p>	5%
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12	Able to evaluate lateral support steel frame systems	Explain the evaluation steps for lateral support steel frame systems	<p>Criteria: Full marks if the answer is complete, clear, in accordance with theory and correct</p> <p>Forms of Assessment : Participatory Activities, Practice/Performance, Tests</p>	Lectures, discussions, questions and answers, and presentations 2 X 50		<p>Material: Observing the evaluation material for lateral supporting steel frames.</p> <p>Reference: <i>Wolfgang Schueller. 2001. High-Rise Building Structures. Bandung: Refika Aditama.</i></p> <hr/> <p>Material: Identifying evaluation steps for lateral support steel frame systems.</p> <p>Reference: <i>National Standardization Agency. 2013. SNI 1727:2013 Minimum Loads for Planning Buildings and Other Structures. Jakarta.</i></p> <hr/> <p>Material: Discuss the evaluation of lateral supporting steel frames.</p> <p>Reference: <i>Jason A Cook. 2005. Structural Steel Framing Options for Mid and High Rise Buildings. Massachusetts Institute of Technology.</i></p>	5%
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13	Able to plan lateral supporting steel frames in tall buildings using computer applications	Planning and evaluating lateral support steel frame systems in tall buildings using computer applications	<p>Criteria: Full marks if the answers are complete, sequential, clear and correct.</p> <p>Form of Assessment : Participatory Activities</p>	Lectures, discussions, questions and answers, and presentations 2 X 50		<p>Material: Observing material for planning lateral support steel frames.</p> <p>Reference: <i>Jason A Cook. 2005. Structural Steel Framing Options for Mid and High Rise Buildings. Massachusetts Institute of Technology.</i></p> <hr/> <p>Material: Identify how to plan and evaluate lateral support steel frame systems using computer applications</p> <p>Library: <i>Pramono. 2006. Construction Engineering Applications practice book</i></p> <hr/> <p>Material: Discuss the application of computers to lateral supporting steel frames.</p> <p>Reader: <i>Pramono. 2006. Construction Engineering Applications practice book</i></p>	5%
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14	Able to plan lateral supporting steel frames in tall buildings using computer applications	Planning and evaluating lateral support steel frame systems in tall buildings using computer applications	<p>Criteria: Full marks if the answers are complete, sequential, clear and correct.</p> <p>Form of Assessment : Participatory Activities</p>	Lectures, discussions, questions and answers, and presentations 2 X 50		<p>Material: Observing material for planning lateral support steel frames.</p> <p>Reference: <i>Jason A Cook. 2005. Structural Steel Framing Options for Mid and High Rise Buildings. Massachusetts Institute of Technology.</i></p> <hr/> <p>Material: Identify how to plan and evaluate lateral support steel frame systems using computer applications</p> <p>Library: <i>Pramono. 2006. Construction Engineering Applications practice book</i></p> <hr/> <p>Material: Discuss the application of computers to lateral supporting steel frames.</p> <p>Reader: <i>Pramono. 2006. Construction Engineering Applications practice book</i></p>	5%
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15	Able to plan lateral supporting steel frames in tall buildings using computer applications	Planning and evaluating lateral support steel frame systems in tall buildings using computer applications	Criteria: Full marks if the answers are complete, sequential, clear and correct. Form of Assessment : Participatory Activities	Lectures, discussions, questions and answers, and presentations 2 X 50		Material: Observing material for planning lateral support steel frames. Reference: <i>Jason A Cook. 2005. Structural Steel Framing Options for Mid and High Rise Buildings. Massachusetts Institute of Technology.</i> Material: Identify how to plan and evaluate lateral support steel frame systems using computer applications Library: <i>Pramono. 2006. Construction Engineering Applications practice book</i> Material: Discuss the application of computers to lateral supporting steel frames. Reader: <i>Pramono. 2006. Construction Engineering Applications practice book</i>	5%
16			Form of Assessment : Test	Final Exam Semester 2 X 50 Minutes			20%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	44.5%
2.	Practical Assessment	1.33%
3.	Practice / Performance	6.17%
4.	Test	48%
		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.