	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 Static Indeterminate Structures	2220103003	Compulsory Study Program Subjects	T=3	P=0	ECTS=4.77	2	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 which 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) and statically indeterminate structural shape modes using the Slope Deflection Method and apply the results of the analysis
	PO - 2 Students are able to analyze internal forces in the form of: M (moment), N (normal force), D (shear force) and statically indeterminate structural shape modes using the Clapeyron Method and apply the results of the analysis.
	PO - 3 Students are able to analyze internal forces in the form of: M (moment), N (normal force), D (shear force) and statically indeterminate structural shape modes, the Cross Method and its analysis applications, and apply the results of the analysis.
	PLO-PO Matrix
	PO Matrix at the end of each learning stage (Sub-PO)

P.O

P.O
PO-1
PO-2
PO-3

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																

Short Course Description	Introduction and analysis of statically indeterminate structures (continuous beam, fixed portal, swaying portal) Slope deflection, Clayperon, and Cross methods. Learning is carried out using the Case Study Method and ends with discussion activities.

References	**Main :**

1. Sabariman, Bambang. 2007. Penyelesaian Statika Slope Deflection . Surabaya: JTS FTUnesa.
2. Sabariman, Bambang. 2013. Mekanika Teknik III (Metode Clapeyron). Surabaya: JTS FTUnesa.
3. Sabariman, Bambang. 2015. AnalisisStruktur Statis Tak Tentu (Metode Cross). Surabaya: JTS FTUnesa.
4. Wang, Chu-Kia. 1987. Analisis StrukturLanjutan Jilid 1, Kusuma Wirawan & Mulyadi Nataprawira Penterjemah.Jakarta: Erlangga.

	Supporters:	

1. Sunggono. 1984. Buku TeknikSipil. Jakarta: Penerbit Nova.
2. Hibbeler, R.C. 2012. StructuralAnalysis, Eighth Edition . NewJersey: Pearson Prentice Hall.
3. Sabariman, Bambang & Dani, H. 2015. Pemanfaatan Gambar Gaya Lintang dalam Perhitungan Momen Statis Tertentu, Jurnal Kajian Pendidikan Teknik Bangunan Vol. 1 Nomer 1/JKPTB/2015.

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	1). Able to distinguish statically uncertain structures from certain static structures, 2.) Able to analyze simple beams and SSTT continuous beams using the Slope Deflection method.	1). Explain the difference between a certain static structure (ST) and a statically indeterminate structure (STT), 2). Analyzing simple beam and continuous beam SSTT Slope Deflection method.	**Criteria:** If the SSTT case study completion analysis includes correct moment analysis, the score is 70, if the free body diagram analysis includes positioning reactions, latitude forces, normal forces and M elements, the score is correct, the score is 15, if the depiction of the M, N, and D planes is correct, the score is 15. **Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers on simple beam and SSTT continuous beam (case study) exercises. 3X50 minutes	Lectures, discussions, questions and answers on simple beam and SSTT continuous beam (case study) exercises. 3x50 minutes	**Material:** Analysis of simple beam and continuous beam SSTT Slope Deflection method. **Bibliography:** *Sabariman, Bambang. 2007. Solving Slope Deflection Statics. Surabaya: JTS FTUnesa.*	1%
2	Able to analyze simple beams and continuous beams SSTT Slope Deflection method.	Analyzing simple beam and continuous beam SSTT Slope Deflection method.	**Criteria:** If the SSTT case study completion analysis includes correct moment analysis, the score is 70, if the free body diagram analysis includes positioning reactions, latitude forces, normal forces and M elements, the score is correct, the score is 15, if the depiction of the M, N, and D planes is correct, the score is 15. **Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers on simple beam and SSTT continuous beam (case study) exercises. 3X50 minutes	Lectures, discussions, questions and answers on simple beam and SSTT continuous beam (case study) exercises. 3x50 minutes	**Material:** Analysis of simple beam and continuous beam SSTT Slope Deflection method. **Bibliography:** *Sabariman, Bambang. 2007. Solving Slope Deflection Statics. Surabaya: JTS FTUnesa.*	1%

3	Able to analyze SSTT fixed portals using the Slope Deflection method.	Analyzing fixed portal SSTT Slope Deflection method.	**Criteria:** If the SSTT case study completion analysis includes correct moment analysis, the score is 70, if the free body diagram analysis includes positioning reactions, latitude forces, normal forces and M elements, the score is correct, the score is 15, if the depiction of the M, N, and D planes is correct, the score is 15. **Form of Assessment** : Participatory Activities	Lectures, discussions, question and answer exercises (case studies) on the SSTT fixed portal with the Slope Deflection method. 3X50 minutes	Lectures, discussions, question and answer exercises (case studies) on the SSTT fixed portal with the Slope Deflection method. 3x50 minutes	**Material:** SSTT fixed portal analysis with Slope Deflection method. **Bibliography:** *Sabariman, Bambang. 2007. Solving Slope Deflection Statics. Surabaya: JTS FTUnesa.*	2%
4	Able to analyze swaying portals SSTT Slope Deflection method.	Analyzing the swaying portal SSTT Slope Deflection method.	**Criteria:** If the SSTT case study completion analysis includes correct moment analysis, the score is 70, if the free body diagram analysis includes positioning reactions, latitude forces, normal forces and M elements, the score is correct, the score is 15, if the depiction of the M, N, and D planes is correct, the score is 15. **Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers practice (case study) swaying portal SSTT Slope Deflection method. 3X50 minutes	Lectures, discussions, questions and answers practice (case study) swaying portal SSTT Slope Deflection method. 3x50 minutes	**Material:** Analysis of the SSTT swaying portal with the Slope Deflection method. **Bibliography:** *Sabariman, Bambang. 2007. Solving Slope Deflection Statics. Surabaya: JTS FTUnesa.*	2%
5	Able to analyze swaying portals SSTT Slope Deflection method.	Analyzing the swaying portal SSTT Slope Deflection method.	**Criteria:** If the SSTT case study completion analysis includes correct moment analysis, the score is 70, if the free body diagram analysis includes positioning reactions, latitude forces, normal forces and M elements, the score is correct, the score is 15, if the depiction of the M, N, and D planes is correct, the score is 15. **Form of Assessment** : Participatory Activities, Tests	Lectures, discussions, questions and answers practice (case study) swaying portal SSTT Slope Deflection method. 3X50 minutes	Lectures, discussions, questions and answers practice (case study) swaying portal SSTT Slope Deflection method. 3x50 minutes	**Material:** Analysis of the SSTT swaying portal with the Slope Deflection method. **Bibliography:** *Sabariman, Bambang. 2007. Solving Slope Deflection Statics. Surabaya: JTS FTUnesa.*	15%

6	Able to analyze simple beams and SSTT continuous beams using the Clapeyron method.	Analyzing simple beam and continuous beam SSTT Clapeyron method.	**Criteria:** If the SSTT case study completion analysis includes correct moment analysis, the score is 70, if the free body diagram analysis includes positioning reactions, latitude forces, normal forces and M elements, the score is correct, the score is 15, if the depiction of the M, N, and D planes is correct, the score is 15. **Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers practice (case study) simple beam and continuous beam SSTT Clapeyron method. 3X50 minutes	Lectures, discussions, question and answer exercises (case study) simple beam and continuous beam SSTT Clapeyron method. 3x50 minutes	**Material:** Analyzing simple beams and SSTT continuous beams using the Clapeyron method. **Bibliography:** *Sabariman, Bambang. 2013. Engineering Mechanics III (Clapeyron Method). Surabaya: JTS FTUnesa.*	2%
7	Able to analyze simple beams and SSTT continuous beams using the Clapeyron method.	Analyzing simple beam and continuous beam SSTT Clapeyron method.	**Criteria:** If the SSTT case study completion analysis includes correct moment analysis, the score is 70, if the free body diagram analysis includes positioning reactions, latitude forces, normal forces and M elements, the score is correct, the score is 15, if the depiction of the M, N, and D planes is correct, the score is 15. **Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers practice (case study) simple beam and continuous beam SSTT Clapeyron method. 3X50 minutes	Lectures, discussions, question and answer exercises (case study) simple beam and continuous beam SSTT Clapeyron method. 3x50 minutes	**Material:** Analyzing simple beams and SSTT continuous beams using the Clapeyron method. **Bibliography:** *Sabariman, Bambang. 2013. Engineering Mechanics III (Clapeyron Method). Surabaya: JTS FTUnesa.*	2%
8	Midterm Exam (UTS) swaying portal SSTT Slope Deflection method.	Completion of the SSTT swaying portal case study with the Slope Deflection method.	**Criteria:** If the SSTT case study completion analysis includes correct moment analysis, the score is 70, if the free body diagram analysis includes positioning reactions, latitude forces, normal forces and M elements, the score is correct, the score is 15, if the depiction of the M, N, and D planes is correct, the score is 15. **Form of Assessment** : Participatory Activities, Tests	The Mid-Term Examination (UTS) completed a case study of the SSTT swaying portal with the Slope Deflection method. 2X50 minutes	The Mid-Term Examination (UTS) completed a case study of the SSTT swaying portal with the Slope Deflection method. 2x50 minutes	**Material:** Completion of the SSTT swaying portal case study with the Slope Deflection method. **Bibliography:** *Sabariman, Bambang. 2007. Solving Slope Deflection Statics. Surabaya: JTS FTUnesa.* **Material:** 1212 **References:** *Sabariman, Bambang. 2013. Engineering Mechanics III (Clapeyron Method). Surabaya: JTS FTUnesa.*	20%

9	Able to analyze the Clapeyron method SSTT fixed portal.	Analyzing the SSTT fixed portal Clapeyron method.	**Criteria:** If the SSTT case study completion analysis includes correct moment analysis, the score is 70, if the free body diagram analysis includes positioning reactions, latitude forces, normal forces and M elements, the score is correct, the score is 15, if the depiction of the M, N, and D planes is correct, the score is 15. **Form of Assessment** : Participatory Activities	Lectures, discussions, question and answer exercises (case study) SSTT fixed portal Clapeyron method. 3X50 minutes	Lectures, discussions, question and answer exercises (case study) SSTT fixed portal Clapeyron method. 3x50 minutes	**Material:** Clapeyron method SSTT fixed portal analysis. **Bibliography:** *Sabariman, Bambang. 2013. Engineering Mechanics III (Clapeyron Method). Surabaya: JTS FTUnesa.*	1%
10	Able to analyze the SSTT swaying portal Clapeyron method.	Analyzing the SSTT sway portal Clapeyron method.	**Criteria:** If the SSTT case study completion analysis includes correct moment analysis, the score is 70, if the free body diagram analysis includes positioning reactions, latitude forces, normal forces and M elements, the score is correct, the score is 15, if the depiction of the M, N, and D planes is correct, the score is 15. **Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers practice (case study) SSTT swaying portal Clapeyron method. 3X50 minutes	Lectures, discussions, questions and answers practice (case study) SSTT swaying portal Clapeyron method. 3x50 minutes	**Material:** Clapeyron method SSTT swaying portal analysis. **Bibliography:** *Sabariman, Bambang. 2013. Engineering Mechanics III (Clapeyron Method). Surabaya: JTS FTUnesa.*	1%
11	Able to analyze simple beam and continuous beam SSTT Cross method.	Analyzing simple beam and continuous beam SSTT Cross method.	**Criteria:** If the SSTT case study completion analysis includes correct moment analysis, the score is 70, if the free body diagram analysis includes positioning reactions, latitude forces, normal forces and M elements, the score is correct, the score is 15, if the depiction of the M, N, and D planes is correct, the score is 15. **Form of Assessment** : Participatory Activities	Lectures, discussions, question and answer exercises (case study) for simple beam and continuous beam SSTT Cross method. 3X50 minutes	Lectures, discussions, question and answer exercises (case study) for simple beam and continuous beam SSTT Cross method. 3x50 minutes	**Material:** Analyzing simple beam and continuous beam SSTT Cross method. **Bibliography:** *Sabariman, Bambang. 2015. Static Indeterminate Structure Analysis (Cross Method). Surabaya: JTS FTUnesa.*	2%

12	Able to analyze simple beam and continuous beam SSTT Cross method.	Analyzing simple beam and continuous beam SSTT Cross method.	**Criteria:** If the SSTT case study completion analysis includes correct moment analysis, the score is 70, if the free body diagram analysis includes positioning reactions, latitude forces, normal forces and M elements, the score is correct, the score is 15, if the depiction of the M, N, and D planes is correct, the score is 15. **Form of Assessment** : Participatory Activities	Lectures, discussions, question and answer exercises (case study) for simple beam and continuous beam SSTT Cross method. 3X50 minutes	Lectures, discussions, question and answer exercises (case study) for simple beam and continuous beam SSTT Cross method. 3x50 minutes	**Material:** Analyzing simple beam and continuous beam SSTT Cross method. **Bibliography:** *Sabariman, Bambang. 2015. Static Indeterminate Structure Analysis (Cross Method). Surabaya: JTS FTUnesa.*	2%
13	Able to analyze SSTT Cross method fixed portals.	Analyzing the Cross method SSTT fixed portal.	**Criteria:** If the SSTT case study completion analysis includes correct moment analysis, the score is 70, if the free body diagram analysis includes positioning reactions, latitude forces, normal forces and M elements, the score is correct, the score is 15, if the depiction of the M, N, and D planes is correct, the score is 15. **Form of Assessment** : Participatory Activities, Tests	Lectures, discussions, question and answer exercises (case studies) on the SSTT Cross method fixed portal. 3X50 minutes	Lectures, discussions, question and answer exercises (case studies) on the SSTT Cross method fixed portal. 3x50 minutes	**Material:** Cross method SSTT fixed portal analysis. **Bibliography:** *Sabariman, Bambang. 2015. Static Indeterminate Structure Analysis (Cross Method). Surabaya: JTS FTUnesa.*	15%
14	Able to analyze the SSTT Cross method swaying portal.	Analyzing the SSTT Cross method swaying portal.	**Criteria:** If the SSTT case study completion analysis includes correct moment analysis, the score is 70, if the free body diagram analysis includes positioning reactions, latitude forces, normal forces and M elements, the score is correct, the score is 15, if the depiction of the M, N, and D planes is correct, the score is 15. **Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers practice (case study) SSTT Cross method swaying portal. 3X50 minutes	Lectures, discussions, questions and answers practice (case study) SSTT Cross method swaying portal. 3x50 minutes	**Material:** Cross method SSTT swaying portal analysis. **Bibliography:** *Sabariman, Bambang. 2015. Static Indeterminate Structure Analysis (Cross Method). Surabaya: JTS FTUnesa.*	2%

15	Able to analyze the SSTT Cross method swaying portal.	Analyzing the SSTT Cross method swaying portal.	**Criteria:** If the SSTT case study completion analysis includes correct moment analysis, the score is 70, if the free body diagram analysis includes positioning reactions, latitude forces, normal forces and M elements, the score is correct, the score is 15, if the depiction of the M, N, and D planes is correct, the score is 15. **Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers practice (case study) SSTT Cross method swaying portal. 3X50 minutes	Lectures, discussions, questions and answers practice (case study) SSTT Cross method swaying portal. 3x50 minutes	**Material:** Cross method SSTT swaying portal analysis. **Bibliography:** *Sabariman, Bambang. 2015. Static Indeterminate Structure Analysis (Cross Method). Surabaya: JTS FTUnesa.*	2%
16	Final Semester Examination (UAS) swing portal SSTT Cross method.	Analyzing the SSTT Cross method swaying portal.	**Criteria:** If the SSTT case study completion analysis includes correct moment analysis, the score is 70, if the free body diagram analysis includes positioning reactions, latitude forces, normal forces and M elements, the score is correct, the score is 15, if the depiction of the M, N, and D planes is correct, the score is 15. **Form of Assessment** : Participatory Activities, Tests	Completion of the SSTT Cross method swaying portal case study. 2X50 minutes	Completion of the SSTT Cross method swaying portal case study. 2x50 minutes	**Material:** Completion of the Cross method SSTT swaying portal case study. **Bibliography:** *Sabariman, Bambang. 2015. Static Indeterminate Structure Analysis (Cross Method). Surabaya: JTS FTUnesa.*	30%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	60%
2.	Test	40%
		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** 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.
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.