		Document Code
	Universitas Negeri Surabaya **Faculty of Engineering,** **Mechanical Engineering Undergraduate Study Program**	

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Mechanics and Strength of Materials 2	2120102114	Compulsory Study Program Subjects	T=2	P=0	ECTS=3.18	3	July 16, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	Novi Sukma Drastiawati	Novi Sukma Drastiawati	Ir. Priyo Heru Adiwibowo, 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	CO1/CPMK1 a. Ability to Identify specific facts about mathematics, science, and engineering that are needed for a particular situation (What knowledge is needed) b. Able to change real world situations into models that are appropriate to related courses c. Able to demonstrate appropriate use of specific facts of mathematics, science, and engineering to elicit performance behavior given specific input.
PO - 2	Able to obtain data about appropriate variables in the field of Mechanical Engineering. b. Able to compare experimental data and results with appropriate theoretical models. c. Be able to explain observed differences between models and experiments.
PO - 3	Able to formulate problems and identify main problems / variables b. Ability to recognize multiple necessary solutions. c. Able to analyze alternative solutions to engineering problems d. Able to provide solutions to technical problems

PLO-PO Matrix

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

PO Matrix at the end of each learning stage (Sub-PO)

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	This course provides an understanding of the properties of supports, analysis of normal forces, moments of trusses in certain static and statically indeterminate theories, tensile, compressive, shear, bending and torsion stresses, thermal, Hooke's law, elastic line equations, and diagram methods. Mohr's circle.

References

Main :

1. Bear, F.P. dan Johnston, E.R. 1987. Statika. (Mekanika untuk Insinyur), Jakarta: Erlangga.
2. Heinz Frick. 1991. Mekanika Teknik 1 (Statika dan Kegunaanya). Yogyakarta: Kanisius.
3. Timoshenko, S. dan Young, D.H. 1990. Mekanika Teknik. Jakarta: Erlangga.
4. Hibbeler, R.C. Engineering Mechanics : Statics, 13th edition. Prentice Hall
5. Rusell C. Hibbeler. Mechanics of Materials, 8th Edition. Prentice Hall

Supporters:

1. [1] R u ssel C . H i bbeler , Engineeri n g Mechanic s: St a ti c s , 13th edition, P rentice Hall [2] R u ssel C . H i b b eler , Mechanic s of Ma t eri a ls, 8th edi t i o n, Prentice H all

Supporting lecturer	Iskandar, S.T., M.T. Mochamad Arif Irfa'i, S.Pd., M.T. Novi Sukma Drastiawati, S.T., M.Eng.

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.Students are able to analyze the properties of supports and normal forces 2.Describe and analyze the results Describe the stress due to combined loads	a. Explain the meaning of stress due to combined loads b. Calculate stress due to combined loads c. Explain the results of calculating combined stresses	**Criteria:** 1.a. Presence 2.b. Activeness in questions and answers, seriousness in attending lectures 3.c. Compliance with the answer key **Form of Assessment** : Participatory Activities, Portfolio Assessment	Lecture discussion questions and answers exercises and assignments Lecture Case study, Discussion in groups Task-1: Calculating stress due to combined loads and calculating combined stress in beams 2x50 minutes 2 X 50		**Material:** Calculating stress due to combined loads and calculating combined stress in beams. **References:** *Bear, FP and Johnston, ER 1987. Statics. (Mechanics for Engineers), Jakarta: Erlangga.*	1%
2	Describing 2D stress transformations: analytical and graphical (Mohr) Describing Plane stress-plane strain	1.a. Explaining 2D stress transformations: analytical and graphical (Mohr) 1.c. Calculating 2D stress transformations: analytical and graphical (Mohr) 1.a. Explaining 2D stress transformations: analytical and graphical (Mohr) 1.a. Explaining Plane stress-plane strain 1.c. Calculating Plane stress-plane strain	**Criteria:** 1.a. Presence 2.b. Activeness in questions and answers, seriousness in attending lectures 3.c. Compliance with the answer key **Form of Assessment** : Participatory Activities, Portfolio Assessment	Lectures, discussions, questions and answers, exercises and assignments , Lectures , case studies, discussions in groups 2 X 50		**Material:** Calculating 2D stress transformations analytically and using the Mohr's circle method Calculating plane stress and plain strain 2 (2x50) minutes **References:** *Bear, FP and Johnston, ER 1987. Statics. (Mechanics for Engineers), Jakarta: Erlangga.* **Material:** Calculating 2D stress transformations analytically and using the Mohr's circle method Calculating plane stress and plain strain 2 (2x50) minutes **References:** *Hibbeler, RC Engineering Mechanics : Statics, 13th edition. Prentice Hall*	1%

3	Describing 2D stress transformations: analytical and graphical (Mohr) Describing Plane stress-plane strain	1.a. Explaining 2D stress transformations: analytical and graphical (Mohr) 1.c. Calculating 2D stress transformations: analytical and graphical (Mohr) 1.a. Explaining 2D stress transformations: analytical and graphical (Mohr) 1.a. Explaining Plane stress-plane strain 1.c. Calculating Plane stress-plane strain	**Criteria:** 1.a. Presence 2.b. Activeness in questions and answers, seriousness in attending lectures 3.c. Compliance with the answer key **Form of Assessment** : Participatory Activities, Portfolio Assessment	Lectures, discussions, questions and answers, exercises and assignments, Lectures, case studies, discussions in groups 2 X 50		**Material:** Calculating 2D stress transformations analytically and using the Mohr's circle method Calculating plane stress and plain strain 2 (2x50) minutes **References:** *Bear, FP and Johnston, ER 1987. Statics. (Mechanics for Engineers), Jakarta: Erlangga.* **Material:** Calculating 2D stress transformations analytically and using the Mohr's circle method Calculating plane stress and plain strain 2 (2x50) minutes **References:** *Hibbeler, RC Engineering Mechanics : Statics, 13th edition. Prentice Hall*	1%
4	Analyzing extreme stresses	1. Calculate tensile and compressive stress 2. 4.a. Describe 3D stress transformation: analytical and graphical 4.b. Describe the State of stress	**Criteria:** 1.a. Presence 2.b. Activeness in attending lectures 3.c. Compliance with the answer key **Form of Assessment** : Participatory Activities, Tests	Lectures, discussions, questions and answers, exercises and assignments. Participation, Written test, (Quiz-3) 4 X 50		**Material:** Analyzing the results of extreme stress calculations **References:** *Bear, FP and Johnston, ER 1987. Statics. (Mechanics for Engineers), Jakarta: Erlangga.* **Material:** Analyzing the results of extreme stress calculations **Reference:** *Russell C. Hibbeler. Mechanics of Materials, 8th Edition. Prentice Hall* **Material:** Analyzing the results of extreme stress calculations **References:** *Timoshenko, S. and Young, DH 1990. Engineering Mechanics. Jakarta: Erlangga.*	5%

5	Analyzing extreme stresses	1. Calculate tensile and compressive stress 2. 4.a. Describe 3D stress transformation: analytical and graphical 4.b. Describe the State of stress	**Criteria:** 1. a. Presence 2. b. Activeness in attending lectures 3. c. Compliance with the answer key **Form of Assessment** : Participatory Activities, Tests	Lectures, discussions, questions and answers, exercises and assignments. Participation, Written test, (Quiz-3) 4 X 50		**Material:** Analyzing the results of extreme stress calculations **References:** *Bear, FP and Johnston, ER 1987. Statics. (Mechanics for Engineers), Jakarta: Erlangga.* **Material:** Analyzing the results of extreme stress calculations **Reference:** *Russell C. Hibbeler. Mechanics of Materials, 8th Edition. Prentice Hall* **Material:** Analyzing the results of extreme stress calculations **References:** *Timoshenko, S. and Young, DH 1990. Engineering Mechanics. Jakarta: Erlangga.*	4%

6	Describe extreme stresses Perform calculations of extreme stresses	2.a. Categorize extreme stresses (principal, max shear and von Mises) 2.a. Explaining extreme stresses (principal, max shear and von Mises) 2.c Calculating extreme stresses (principal, max shear and von Mises)	**Criteria:** 1.a. Presence 2.b. Activeness in attending lectures 3.c. Compliance with the answer key **Forms of Assessment** : Participatory Activities, Portfolio Assessment, Practice / Performance	Lectures, discussions, questions and answers, exercises and assignments. 2 X 50		**Material:** Calculating principal stress, maximum shear stress, and stress calculation methods (Von Mises and Tresca) **References:** *Bear, FP and Johnston, ER 1987. Statics. (Mechanics for Engineers), Jakarta: Erlangga.* **Material:** Calculating principal stress, maximum shear stress, and stress calculation methods (Von Mises and Tresca) **References:** *Russell C. Hibbeler. Mechanics of Materials, 8th Edition. Prentice Hall* **Material:** Calculating principal stress, maximum shear stress, and stress calculation methods (Von Mises and Tresca) **References:** *Heinz Frick. 1991. Engineering Mechanics 1 (Statics and Its Uses). Yogyakarta: Kanisius.*	2%

7	Describe extreme stresses Perform calculations of extreme stresses	2.a. Categorize extreme stresses (principal, max shear and von Mises) 2.a. Explaining extreme stresses (principal, max shear and von Mises) 2.c Calculating extreme stresses (principal, max shear and von Mises)	**Criteria:** 1.a. Presence 2.b. Activeness in attending lectures 3.c. Compliance with the answer key **Form of Assessment** : Participatory Activities, Practice/Performance	Lectures, discussions, questions and answers, exercises and assignments. 2 X 50		**Material:** Calculating principal stress, maximum shear stress, and stress calculation methods (Von Mises and Tresca) **References:** *Bear, FP and Johnston, ER 1987. Statics. (Mechanics for Engineers), Jakarta: Erlangga.* **Material:** Calculating principal stress, maximum shear stress, and stress calculation methods (Von Mises and Tresca) **References:** *Russell C. Hibbeler. Mechanics of Materials, 8th Edition. Prentice Hall* **Material:** Calculating principal stress, maximum shear stress, and stress calculation methods (Von Mises and Tresca) **References:** *Heinz Frick. 1991. Engineering Mechanics 1 (Statics and Its Uses). Yogyakarta: Kanisius.*	6%
8	Sub Summative Exam	Sub Summative Exam	**Criteria:** Compliance with the answer key **Form of Assessment** : Participatory Activities, Tests	Sub Summative Exam 2 X 50		**Material:** SUB SUMATIVE TEST **Reference:** *Bear, FP and Johnston, ER 1987. Statics. (Mechanics for Engineers), Jakarta: Erlangga.* **Material:** SUB SUMATIVE TEST **Reference:** *Hibbeler, RC Engineering Mechanics: Statics, 13th edition. Prentice Hall*	20%
9	1.Describing security figures - design implementation 2.4.a Explaining security figures - 4.b Design implementation 4.d Analyzing security figures - Design implementation	Score criteria: Special: 90 to 100; Very good: 76 to 89; Average: 56 to 75; Below average: 0 to 55	**Criteria:** 1.a. Presence 2.b. Activeness in attending lectures 3.c. Compliance with the answer key **Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers, exercises and assignments 4 X 50		**Material:** Analyzing safety figures in stress calculations **Reference:** *Hibbeler, RC Engineering Mechanics: Statics, 13th edition. Prentice Hall*	3%

10	1. Describing deflection in beams Calculating deflection in beams 2. 2.a. Explaining the deflection in a beam 2.b. Describing the deflection in a particular beam: Double integration, discontinuous, moment area 2.b. Calculating the deflection in a particular beam: Double integration, discontinuous, moment area 2.a. Explain the deflection on the shaft due to critical rotation 2.b. Calculating the deflection on the shaft due to critical rotation 2.b. Calculating indeterminate beam deflection: Double integration, discontinuity, moment area	Score criteria: Special: 90 to 100; Very good: 76 to 89; Average: 56 to 75; Below average: 0 to 55	**Criteria:** Score criteria: Special: 90 to 100; Very good: 76 to 89; Average: 56 to 75; Below average: 0 to 55 **Form of Assessment** : Participatory Activities	Participation, Written test, (Quiz-6)		**Material:** calculating beam deflection **References:** *Bear, FP and Johnston, ER 1987. Statics. (Mechanics for Engineers), Jakarta: Erlangga.*	3%
11	1. Describing deflection in beams Calculating deflection in beams 2. 2.a. Explaining the deflection in a beam 2.b. Describing the deflection in a particular beam: Double integration, discontinuous, moment area 2.b. Calculating the deflection in a particular beam: Double integration, discontinuous, moment area 2.a. Explain the deflection on the shaft due to critical rotation 2.b. Calculating the deflection on the shaft due to critical rotation 2.b. Calculating indeterminate beam deflection: Double integration, discontinuity, moment area	Score criteria: Special: 90 to 100; Very good: 76 to 89; Average: 56 to 75; Below average: 0 to 55	**Criteria:** Score criteria: Special: 90 to 100; Very good: 76 to 89; Average: 56 to 75; Below average: 0 to 55 **Form of Assessment** : Participatory Activities	Participation, Written test, (Quiz-6)		**Material:** calculating beam deflection **References:** *Bear, FP and Johnston, ER 1987. Statics. (Mechanics for Engineers), Jakarta: Erlangga.*	3%

12	1. Able to explain buckling in columns (vertical beams). Explain the strain energy method for structural deflection analysis 2. 2.a. Describe buckling in columns (vertical beams) 2.b. Calculate buckling in columns (vertical beams) 2.a. Can explain the strain energy method for structural deflection 2.b. Can calculate the strain energy method for structural deflection 2. a.Can explain Castigliano's method for structural deflection 2.b.Can calculate Castigliano's method for structural deflection	2.a. Describe buckling in columns (vertical beams) 2.b. Calculate buckling in columns (vertical beams) 2.a. Can explain the strain energy method for structural deflection 2.b. Can calculate the strain energy method for structural deflection 2. a.Can explain Castigliano's method for structural deflection 2.b.Can calculate Castigliano's method for structural deflection	**Criteria:** Score criteria: Special: 90 to 100; Very good: 76 to 89; Average: 56 to 75; Below average: 0 to 55 **Form of Assessment** : Participatory Activities	Participation, Written test, (Quiz-6)		**Material:** Calculating buckling in columns (ertical beams) Calculating deflections in structures Calculating the amount of strain energy **References:** *Bear, FP and Johnston, ER 1987. Statics. (Mechanics for Engineers), Jakarta: Erlangga.* **Material:** Calculating buckling in columns (ertical beams) Calculating deflection in structures Calculating the amount of strain energy **Reference:** *Hibbeler, RC Engineering Mechanics : Statics, 13th edition. Prentice Hall*	5%
13	1. Able to explain buckling in columns (vertical beams). Explain the strain energy method for structural deflection analysis 2. 2.a. Describe buckling in columns (vertical beams) 2.b. Calculate buckling in columns (vertical beams) 2.a. Can explain the strain energy method for structural deflection 2.b. Can calculate the strain energy method for structural deflection 2. a.Can explain Castigliano's method for structural deflection 2.b.Can calculate Castigliano's method for structural deflection	2.a. Describe buckling in columns (vertical beams) 2.b. Calculate buckling in columns (vertical beams) 2.a. Can explain the strain energy method for structural deflection 2.b. Can calculate the strain energy method for structural deflection 2. a.Can explain Castigliano's method for structural deflection 2.b.Can calculate Castigliano's method for structural deflection	**Criteria:** Score criteria: Special: 90 to 100; Very good: 76 to 89; Average: 56 to 75; Below average: 0 to 55 **Form of Assessment** : Participatory Activities	Participation, Written test, (Quiz-6)		**Material:** Calculating buckling in columns (ertical beams) Calculating deflections in structures Calculating the amount of strain energy **References:** *Bear, FP and Johnston, ER 1987. Statics. (Mechanics for Engineers), Jakarta: Erlangga.* **Material:** Calculating buckling in columns (ertical beams) Calculating deflection in structures Calculating the amount of strain energy **Reference:** *Hibbeler, RC Engineering Mechanics : Statics, 13th edition. Prentice Hall*	5%
14	Analyzing problems resulting from combined stress calculations, stress transformation, extreme stresses, deflections in beams, buckling in vertical beam columns, and strain	4.C. Analyze and provide alternative solutions to engineering problems	**Criteria:** Score criteria: Special: 90 to 100; Very good: 76 to 89; Average: 56 to 75; Below average: 0 to 55 **Forms of Assessment** :	Participation, Performance		**Material:** • Phase 1: Orientation to the problem The lecturer explains the learning objectives,	5%

	energy methods for structural deflection analysis		Participatory Activities, Portfolio Assessment, Practice / Performance			explains the logistics required, motivates students towards the problem that will be chosen • Phase 2: Organizes students to study Lecturer helps students define and organize learning tasks related to the problem chosen in Matkul Mekban 2 Students Students make observations in the field through articles or real events until they find the topic of the problem Phase 3: Guiding Group Investigation Lecturers encourage students to obtain appropriate information to assist in solving selected problems or case studies related to the mechanics and strength of materials course 2 Students carry out the directions given by the lecturer • Phase 4: Develop and present the results of their work. The lecturer facilitates students in analyzing and presenting them in the form of video work. Students collect their work according to the agreed time limit. • Phase 5: Analyze and evaluate the problem solving process. Lecturers assist students in the process TM reflection and evaluation: 2 (2x50) minutes - Main 1-4 Grade criteria: Special: 90 to 100; Very good: 76 to 89; Average: 56 to 75; Below average: 0 to 55 **References:** *Hibbeler, RC Engineering Mechanics:*		

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						students in analyzing and presenting them in the form of video work. Students collect their work according to the agreed time limit. • Phase 5: Analyze and evaluate the problem solving process. Lecturers assist students in the process TM reflection and evaluation: 2 (2x50) minutes - Main 1-4 Grade criteria: Special: 90 to 100; Very good: 76 to 89; Average: 56 to 75; Below average: 0 to 55 **Reference:** *Heinz Frick. 1991. Engineering Mechanics 1 (Statics and Its Uses). Yogyakarta: Kanisius.* **Material:** • Phase 1: Orientation to the problem The lecturer explains the learning objectives, explains the logistics required, motivates students towards the problem that will be chosen • Phase 2: Organizes students to study Lecturer helps students define and organize learning tasks related to the problem chosen in Matkul Mekban 2 Students Students make observations in the field through articles or real events until they find the topic of the problem Phase 3: Guiding Group Investigation Lecturers encourage students to obtain appropriate information to assist in solving selected problems or case studies related to the mechanics and strength of		

						materials course 2 Students carry out the directions given by the lecturer • Phase 4: Develop and present the results of their work. The lecturer facilitates students in analyzing and presenting them in the form of video work. Students collect their work according to the agreed time limit. • Phase 5: Analyze and evaluate the problem solving process. Lecturers assist students in the process TM reflection and evaluation: 2 (2x50) minutes - Main 1-4 Grade criteria: Special: 90 to 100; Very good: 76 to 89; Average: 56 to 75; Below average: 0 to 55 **References:** *[1] R u ssel C . H i bbeler , Engineering Mechanic s: St a ti cs , 13th edition, P rentice Hall [2] R u ssel C . H ibb eler , Mechanic s of Ma t eri a ls, 8th edition, Prentice H all*	
15	Analyzing problems resulting from combined stress calculations, stress transformation, extreme stresses, deflections in beams, buckling in vertical beam columns, and strain energy methods for structural deflection analysis	4.C. Analyze and provide alternative solutions to engineering problems	**Criteria:** Score criteria: Special: 90 to 100; Very good: 76 to 89; Average: 56 to 75; Below average: 0 to 55 **Forms of Assessment** : Participatory Activities, Portfolio Assessment, Practice / Performance	Participation, Performance		**Material:** • Phase 1: Orientation to the problem The lecturer explains the learning objectives, explains the logistics required, motivates students towards the problem that will be chosen • Phase 2: Organizes students to study Lecturer helps students define and organize learning tasks related to the problem chosen in Matkul Mekban 2 Students Students make observations in the field through articles or real events until they find the topic of the problem Phase 3: Guiding	5%

							Group Investigation Lecturers encourage students to obtain appropriate information to assist in solving selected problems or case studies related to the mechanics and strength of materials course 2 Students carry out the directions given by the lecturer • Phase 4: Develop and present the results of their work. The lecturer facilitates students in analyzing and presenting them in the form of video work. Students collect their work according to the agreed time limit. • Phase 5: Analyze and evaluate the problem solving process. Lecturers assist students in the process TM reflection and evaluation: 2 (2x50) minutes - Main 1-4 Grade criteria: Special: 90 to 100; Very good: 76 to 89; Average: 56 to 75; Below average: 0 to 55 **References:** *Hibbeler, RC Engineering Mechanics: Statics, 13th edition. Prentice Hall* **Material:** • Phase 1: Orientation to the problem The lecturer explains the learning objectives, explains the logistics required, motivates students towards the problem that will be chosen • Phase 2: Organizes students to study Lecturer helps students define and organize learning tasks related to the problem	

						chosen in Matkul Mekban 2 Students Students make observations in the field through articles or real events until they find the topic of the problem Phase 3: Guiding Group Investigation Lecturers encourage students to obtain appropriate information to assist in solving selected problems or case studies related to the mechanics and strength of materials course 2 Students carry out the directions given by the lecturer • Phase 4: Develop and present the work. The lecturer facilitates students in analyzing and presenting it in the form of video work. Students collect their work according to the agreed time limit. • Phase 5: Analyze and evaluate the problem solving process. The lecturer helps students in the process. TM reflection and evaluation: 2 (2x50) minutes - Main 1-4 Grade criteria: Special: 90 to 100; Very good: 76 to 89; Average: 56 to 75; Below average: 0 to 55 **References:** *Bear, FP and Johnston, ER 1987. Statics. (Mechanics for Engineers), Jakarta: Erlangga.* --- **Material:** • Phase 1: Orientation to the problem The lecturer explains the learning objectives, explains the logistics required, motivates students towards the problem that		

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						Lecturers assist students in the process TM reflection and evaluation: 2 (2x50) minutes - Main 1-4 Grade criteria: Special: 90 to 100; Very good: 76 to 89; Average: 56 to 75; Below average: 0 to 55 **References:** *[1] R u ssel C . H i bbeler , Engineering Mechanic s: St a ti cs , 13th edition, P rentice Hall [2] R u ssel C . H ibb eler , Mechanic s of Ma t eri a ls, 8th edition, Prentice H all*	

16			**Criteria:** Score criteria: Special: 90 to 100; Very good: 76 to 89; Average: 56 to 75; Below average: 0 to 55 **Form of Assessment** : Participatory Activities, Tests	TEST		**Material:** Summative Examination **Bibliography:** *Bear, FP and Johnston, ER 1987. Statics. (Mechanics for Engineers), Jakarta: Erlangga.* **Material:** Summative Exam **Reader:** *Heinz Frick. 1991. Engineering Mechanics 1 (Statics and Its Uses). Yogyakarta: Kanisius.* **Material:** Summative Examination **Bibliography:** *Timoshenko, S. and Young, DH 1990. Engineering Mechanics. Jakarta: Erlangga.* **Material:** Summative Exam **Literature:** *Hibbeler, RC Engineering Mechanics : Statics, 13th edition. Prentice Hall* **Material:** Summative Exam **Reader:** *Russell C. Hibbeler. Mechanics of Materials, 8th Edition. Prentice Hall* **Material:** Summative Exam **Literature:** *[1] R u ssel C . H i bbeler , Engineering Mechanic s: St a ti cs , 13th edition, P rentice Hall [2] R u ssel C . H ibb eler , Mechanic s of Ma t eri a ls, 8th edition, Prentice H all*	30%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	57.01%
2.	Portfolio Assessment	5.51%
3.	Practice / Performance	7.01%
4.	Test	29.5%
		99.03%

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.