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

SEMESTER LEARNING PLAN

Courses		CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Composite Technology		2120102093		T=2	P=0	ECTS=3.18	5	July 18, 2024
AUTHORIZATION		SP Developer		Course Cluster Coordinator			Study Program Coordinator	
		....		....			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)
	PLO-PO Matrix
	P.O
	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

Short Course Description	Students can explain the definition of composites, forms of reinforcement, arrangement of reinforcements, types of matrices, types of composites, manufacturing technology, composite mechanics and composite applications.

References	**Main :**
	1. Dietz,1969, 1CComposites Engineering Laminates 1D,MIT Press, Cambridges Mass 2. ScwartzhR.T, 1968, 1DFundamental Aspects ofReinforced Plastic Composites 1D, Willey Interscience 3. JonesR, 1975, 1DMechanic of Composites Materials 1D,Mc Graw Hill, Kogakusha 4. Bahan-bahandari Internet dan kepustakaan lain
	Supporters:

Supporting lecturer	Mochamad Arif Irfa'i, S.Pd., 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	Understanding Composite Materials.	1. Students can explain the meaning of composite materials. 2. Students are able to explain the general properties of composite materials.		1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50			0%
2	Understand the classification of composite materials	1. Students are able to explain the materials that make up composites. 2. Students are able to explain the classification of composite materials		1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50			0%
3	Understanding the mechanical behavior of composite laminate I.	1. Students can explain the definition of rule of mixtures (ROM). 2. Students can explain the concepts of isostress and isostrain.		1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50			0%
4	Understanding the mechanical behavior of composite laminate II.	1. Students can explain the concepts of anisotropic and orthotropic isotropic materials. 2. Students can explain the concept of stress components.		1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50			0%
5	Understanding the mechanical behavior of I-layered composites.	1. Students can explain the concept of layered composites. 2. Students can explain the analysis of micro and macro layered composites.		1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50			0%
6	Understanding the mechanical behavior of layered composites II	1. Students can explain the angular orientation of reinforcing fibers. 2. Students can explain the sequence of each layer and the strength of the composite		1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50			0%
7	Mastering the study material from the 1st to the 6th meeting	understand the study material from the 1st meeting to the 6th meeting		Written exam 2 X 50			0%

8	Understanding the mechanical behavior of short fiber composites and loading effectiveness	1. Students can explain the effect of fiber length. 2. Students can explain random short fibers.		1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50			0%
9	Understand composite failure theory	1. Students can explain maximum stress failure theory. 2. Students can explain maximum strain failure theory.		1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50			0%
10	Understanding composite design and manufacturing I.	1. Students are able to explain the types of reinforcement. Students can explain the types of composite manufacturing		1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50			0%
11	Understanding composite design and manufacturing II	1. Students can explain the composite hand lay up process. 2. Students can explain vacuum bag molding.		1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50			0%
12	Understand mechanical testing of composite materials	1. Students can understand composite tensile testing. 2. Students can understand composite bending testing. 3. Students can understand composite impact testing.		1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50			0%
13	Understand mechanical testing of composite materials	1. Students can understand the ASTM D 638 testing standard. 2. Students can understand the ASTM D 695 testing standard.		1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50			0%
14	Understand the applications of composite materials	1. Students can understand the application of composite materials for sports. Students can understand the application of composite materials for transportation		1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50			0%

15	Understanding the development of natural fiber composites	1. Students can understand the types of natural fibers for composite materials. Students can understand the manufacturing of natural fiber reinforced composites		1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50			0%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
		0%

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.