	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
Materials Science II	2120102025		T=2	P=0	ECTS=3.18	2	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	This course studies metallic bonds, mechanical properties, physical properties, chemical properties, defects in materials, introduction to material testing, diffusion and phase transformation processes, Fe-Fe3C diagrams, heat treatment and its effect on performance and engineering of material properties.
References	**Main :**

1. [1] Suherman, W. 1999. Ilmu Logam 1. Penerbit ITS: Surabaya
2. [2] Suherman, W. 1999. Ilmu Logam I1. Penerbit ITS: Surabaya
3. [3] Callister, William D. 2003. Material Science and Engineering An Introduction. Sixth Edition. Jhon Wiley & Sons, Inc: USA
4. [4] Smith, William F. Hashemi, Javad. 2006. Foundations of Material Science and Engineering. Fourth Edition. Mc-Graw-Hill Companies, Inc: New York
5. [5] Smith, William F. 1993. Structure and Properties of Engineering Alloy. Second Edition. Mc-Graw-Hill Companies, Inc: New York

Supporters:	
Supporting lecturer	Arya Mahendra Sakti, S.T., M.T. Mochamad Arif Irfa'i, S.Pd., M.T. Novi Sukma Drastiawati, S.T., M.Eng. Andita Nataria Fitri Ganda, 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	· Know the mechanical properties of metal materials and what influences them · Be able to explain the process and stages of material selection for technical applications.	Students are able to carry out product design stages based on the basic properties of materials	**Criteria:** According to the Rubric	Lectures, discussions and questions and answers 4 X 50			0%
2							0%
3	Understand the factors that influence changes in material properties. Understand the concept of changes in properties due to internal engineering of materials	Able to describe the mechanism of changes in mechanical properties through the material strengthening process. Be able to explain what dislocations and slip systems are in metal materials	**Criteria:** According to the Rubric	Lectures, discussions, exercises and questions and answers 6 X 50			0%
4							0%
5							0%
6	Understand the concept of fracture in materials and the factors that influence it	Able to identify the type of fracture and analyze the cause	**Criteria:** According to the Rubric	Lectures, discussions, exercises and questions and answers 3 X 50			0%
7	Understand the use of phase diagrams in applications for making alloys of metal and ceramic materials	· Able to explain the function of phase diagrams · Able to identify eutectic and isomorphic microstructures · Able to classify the reactions that occur in areas in the phase diagram · Able to calculate composition on either binary or ternary phase diagrams	**Criteria:** According to the Rubric	Lectures, discussions, questions and answers and 3 X 50 exercises			0%
8							0%
9							0%
10	Understand the classification of iron and steel and the influence of alloying elements on iron-steel properties	· Able to identify phases in the Fe-Fe3C phase diagram · Able to identify types of iron and steel · Able to describe the effect of alloying elements on properties	**Criteria:** According to the Rubric	Lectures, discussions, questions and answers and 2 X 50 exercises			0%

11	Understand the transformation of material properties due to heating cycles	· Able to describe changes in properties due to changes in temperature, phase and cooling speed using the principle of phase transformation. Able to explain phase transformation kinetics	**Criteria:** According to the Rubric	Lectures, discussions, questions and answers, and 4 X 50 exercises			0%
12							0%
13	Understand the stages of treatment and formation and their influence on traits	· Able to classify heat treatments on metal · Able to describe the heating scheme for each treatment · Able to explain the stages of metal formation	**Criteria:** According to the Rubric	Lectures, discussions, questions and answers, and 2 X 50 exercises			0%
14							0%
15							0%
16							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.