

## Universitas Negeri Surabaya Faculty of Engineering, Mechanical Engineering Undergraduate Study Program

Document Code

				SEM	IESTER	R LEA	RNI	NG	PL/	٩N				
Courses			C	CODE		Course F	amily		Cred	lit We	ight		SEMESTER	Compilation Date
Materials	s Sci	ence I	2	2120102024	4				T=2	P=0	ECTS	=3.18	1	July 18, 2024
AUTHOR	RIZAT	ION	s	SP Develop	per	4		Cours	e Clus	ster C	oordin	ator	Study Progra Coordinator	
								······				Ir. Priyo Heru Adiwibowo, S.T., M.T.		
Learning model	J	Case Studies												
Progran Learnin		PLO study prog	gram th	nat is char	ged to the c	ourse								
Outcom		Program Objectives (PO)												
(PLO)		PLO-PO Matrix												
		P.O												
		PO Matrix at the end of each learning stage (Sub-PO)												
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Short Course Descript	tion	This course discu formation proces classification of crystallization, de	ses. Una engineer	derstanding ring materi	g electron non als, mechanic	nenclature, al properti	, atomic ies of n	and cr	rystal s, me	struct chanio	ures, cl cal testi	nemica	l bonds and r ystal structure	netallic bonds, , Miller index,
Referen	ces	Main :												
	<ol> <li>Avner, Sidney. 1974. "Introduction To Physical Metallurgy 2nd Edition". Cuny, New York : Mc Graw-Hill.</li> <li>Dieter, George E. 1986. "Metalurgi Mekanik jilid 1". Edisi 3. Diterjemahkan oleh Sriati Djaprie. Jakarta : Erlangga</li> <li>Dieter, George E. 1990. " Metalurgi Mekanik Jilid 2". Edisi 3 Volume 2. Diterjemahkan oleh Sriati Djaprie. Jakarta : Erlangga.</li> <li>Dieter, George E. 1986. "Mechanical Metallurgy 3rd". New York : Mc Graw-Hill.</li> <li>Smallman, R.E. and Bishop, R.J. 1999. " Modern Physical Metallurgy and Materials Engineering 6th Edition". UK : Butterworth-Heinemann.</li> <li>Suherman, Wahid, Ir. 1987. "Pengetahuan Bahan". Edisi Pertama. Surabaya : ITS.</li> </ol>									prie. Jakarta :				
		Supporters:												
Supporting lecturer Ir. Priyo Heru Adiwibow Mochamad Arif Irfa'i, S Novi Sukma Drastiawa		fa'i, S.Po	d., M.T.											
Week-	eac sta	nal abilities of ch learning age		Evaluation		& Form	Lear Studer		Help Learning, Learning methods, Student Assignments, [Estimated time] fline (Online (online)		e)	Learning materials [ References ]	Assessment Weight (%)	
(1)		(2)		(2)	(4)		offli	ne)			<u> </u>		-	(9)
(1)		(2)		(3)	(4)		(5				(6)		(7)	(8)

1	Know the definition of engineering materials Understand the stages of selecting engineering materials Understand the properties of materials Able to ask questions from the material presented Able to answer questions effectively	Able to explain the definition of technical materials Able to explain the stages of selecting technical materials Able to explain the stages of testing on materials Able to explain the stages of testing on materials Able to explain the process stages of technical materials Able to describe the process stages of technical materials Able to discuss in effective language the material presented	Criteria: 1.1. If you are able to answer all the questions correctly you will get a score of 100 2.2. If you are able to answer two questions correctly you will get a score of 70 3.3. If you are able to answer one question correctly you will get 40 points	Lectures and Questions and Answers 2 X 50		0%
2	Know the definition of technical materials Understand the stages of selecting technical materials Understand the properties of materials Understand testing on materials Able to ask questions from the material presented Able to answer questions effectively	Able to explain the definition of technical materials Able to explain the stages of selecting technical materials Able to explain testing on materials Able to explain the stages of testing on materials Able to explain the process stages of technical materials Able to describe the process stages of technical materials Able to discuss in effective language the material presented	Criteria: 1.1. If you are able to answer all the questions correctly you will get a score of 100 2.2. If you are able to answer two questions correctly you will get a score of 70 3.3. If you are able to answer one question correctly you will get 40 points	Lectures and Questions and Answers 2 X 50		0%
3	Understand atomic concepts Understand atomic bonds Understand metallic bonds	Describe atoms in materials Explain types of atomic bonds Describe types of atomic bonds Be able to answer questions in writing	Criteria: 1.1. If you are able to answer 4 questions correctly you will get a score of 100 2.2. If you are able to answer 3 questions correctly you will get a score of 75 3.3. If you are able to answer 2 questions correctly you will get 50 points 4.4. If you are able to answer 1 question correctly you will get 25 points	Lectures and written assignments 2 X 50		0%

4	Able to understand the crystal structure of materials (metals)	Able to explain the definition of crystal structure in metals Able to explain unit cells and lattices Able to explain various types of crystal lattices Able to describe face centered cubic, body centered cubic and hexagonal closed pack Able to answer questions from the material given in writing and orally	Criteria: 1.1. If you are able to answer all the questions correctly you will get a score of 100 2.2. If you are able to answer 3 questions correctly you will get a score of 75 3.3. If you are able to answer 2 questions correctly you will get 50 points 4.4. If you are able to answer 1 question correctly you will get 25 points	Live lectures and questions and answers 2 X 50		0%
5	Understanding shear planes in crystal structures Knowing how to determine the side lengths of a cube in a crystal plane Knowing how to determine the Miller index in a crystal plane	Explaining shear planes in crystal structures Describing shear planes Describing how to determine the side length of a cube in a crystal plane Explaining how to determine the Miller index Describing crystal planes using the Miller index	Criteria: 1.1. If you are able to answer all the questions correctly you will get a score of 100 2.2. If you are able to answer 4 questions correctly you will get a score of 80 3.3. If you are able to answer 3 questions correctly you will get a score of 60 4.4. If you are able to answer 2 questions correctly you will get 40 points 5.5. If you are able to answer 1 question correctly you will get 20 points 6.6. If you are able to answer 0 questions correctly you will get 0 marks	Lectures, discussions and questions and answers 2 X 50		0%
6	Understanding shear planes in crystal structuresKnowing how to determine the side lengths of a cube in a crystal planeKnowing how to determine the Miller index in a crystal plane	Explaining shear planes in crystal structures Describing shear planes Describing how to determine the side length of a cube in a crystal plane Explaining how to determine the Miller index Describing crystal planes using the Miller index	Criteria: 1.1. If you are able to answer all the questions correctly, you will get a score of 100 2.2. If you are able to answer 2 questions correctly, you will get a score of 70 3.3. If you are able to answer 1 question correctly, you will get 35 points 4.4. If you are unable to answer all questions correctly, you will get a score of 0	Lectures, discussions and questions and answers 2 X 50		0%

7	Understand the process of crystallization and recrystallization Understand defects in crystals Understand the process of cold working on materials Understand the process of plastic deformation in crystals	Explain the processes of crystallization and recrystallization Explain the defects in crystals Describe the defects in crystals Analyze the defects in crystals Explain the process of cold working on materials Explain the process of plastic deformation Classify deformations in crystals	Criteria: 1.1. If you are able to answer all the questions correctly, you will get a score of 100 2.2. If you are able to answer 3 questions correctly, you will get a score of 75 3.3. If you are able to answer 2 questions correctly, you will get 50 points 4.4. If you are able to answer 1 question correctly, you will get 25 points 5.4. If you cannot answer all the questions you will get a score of 0	Lectures, discussions and questions and answers 2 X 50		0%
8	Sub Summative Exam	Sub Summative Exam	<b>Criteria:</b> Sub Summative Exam	Written Test 2 X 50		0%

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9	Understand the	Explain the	Criteria:	Lectures,		0%
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			the concept, with			
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			media according			
			to media criteria,			
			correct answers			
			to the questioner,			
			able to formulate			
			suggestions for			
			improvement			
			3.3			
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11	Understanding	Explaining	Criteria:	Lectures,		0%
	about non-ferrous metals	non-ferrous metals	1.4	discussions		
	metals	Analyzing non-	2.The presentation	and		
		ferrous metals	was carried out	questions		
			coherently, with	and		
			appropriate	answers		
			intonation and	2 X 50		
			emphasis,			
			showing a good			
			understanding of			
			the concept, with			
			the help of ppt			
			media according			
			to media criteria,			
			correct answers			
			to the questioner,			
			able to formulate			
			suggestions for			
			improvement			
			3.3			
			4.The presentation			
			was carried out			
			coherently,			
			intonation and			
			emphasis were			
			appropriate, but			
			lacking in			
			understanding			
			some concepts,			
			assistance can			
			be provided via			
			ppt media			
			according to			
			media criteria,			
			answers from the			
			questioner are			
			generally			
			correct,, able to			
			formulate			
			suggestions for			
			improvement			
			5.2			
			6.The presentation			
			was carried out,			
			was not coherent			
			and/or showed a			
			lack of			
			understanding of			
			several concepts, assistance via ppt			
			media but did not			
			meet the media			
			criteria, answers from the			
			questioner were			
			-			
			generally			
			incorrect, able to			
			formulate			
			suggestions for			
			improvement			
			7.1			
			8.The presentation			
			was carried out,			
			but was not			
			coherent and/or			
			showed a lack of			
			understanding of			
			many concepts,			
			did not use ppt			
			media, the			
			answer from the			
			questioner was			
			incorrect, unable			
			to formulate			
			suggestions for			
			improvement			

12	Able to understand non-metallic materials	Able to explain non-metallic materials. Able to give examples of non-metallic materials. Able to classify non- metallic materials	Criteria: 1.1. If you are able to answer all the questions correctly you will get a score of 100 2.2. If you are able to answer 3 questions correctly you will get a score of 75 3.3. If you are able to answer 2 questions correctly you will get 50 points 4.4. If you are able to answer 1 question correctly you will get 25 points 5.5. If you are unable to answer all the questions you will get a score of 0	Lectures, discussions and questions and answers 2 X 50		0%
13	Understand the composition of alloys in a material. Understand the phase diagram. Understand the iron-iron carbide balance diagram	Explaining the composition of alloys of a material Describing the composition of alloys of a material Explaining phase diagrams Drawing phase diagrams Analyzing phase diagrams	Criteria: 1.1. If you are able to answer all the questions correctly you will get a score of 100 2.2. If you are able to answer 1 question correctly you will get 50 points	Lectures, discussions and questions and answers 2 X 50		0%
14	Understand the composition of alloys in a material. Understand the phase diagram. Understand the iron-iron carbide balance diagram	Explaining the composition of alloys of a material Describing the composition of alloys of a material Explaining phase diagrams Describing phase diagrams Analyzing phase diagrams	Criteria: 1.1. If you are able to answer all the questions you will get a score of 100 2.2. If you are able to answer 1 question you will get 50 points	Lectures, discussions and questions and answers 2 X 50		0%
15	Using the iron carbide diagram to determine the carbon content in a material	Explaining the iron-iron carbide balance diagram Describing the iron-carbide balance diagram Analyzing the iron-iron carbide balance diagram to determine the value of carbon content in a material	Criteria: 1.1. If you are able to answer all the questions correctly you will get a score of 100 2.2. If you are able to answer 2 questions correctly you will get a score of 70 3.3. If you are able to answer 1 question correctly you will get 40 points	Lectures, discussions and questions and answers 2 X 50		0%
16	Final exams	Final exams	Criteria: Written Exam	Written Exam 2 X 50		0%

 Evaluation Percentage Recap: Case Study

 No
 Evaluation

 Percentage

 0%

## 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.
- 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.