

		Universitas Negeri Surabaya Vocational Faculty, D4 Mechanical Engineering Study Program					Document Code																																	
SEMESTER LEARNING PLAN																																								
Courses		CODE	Course Family		Credit Weight		SEMESTER	Compilation Date																																
Forming Techniques		2130202022			T=0	P=0	ECTS=0	3 July 17, 2024																																
AUTHORIZATION		SP Developer		Course Cluster Coordinator		Study Program Coordinator																																		
			Arya Mahendra Sakti, S.T., M.T.																																		
Learning model	Project Based Learning																																							
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																							
	Program Objectives (PO)																																							
	PLO-PO Matrix																																							
	<table border="1" style="margin: auto;"> <tr> <td style="width: 100px; height: 30px;"></td> <td style="width: 100px; height: 30px; text-align: center;">P.O</td> </tr> </table>									P.O																														
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	PO Matrix at the end of each learning stage (Sub-PO)																																							
	<table border="1" style="margin: auto;"> <tr> <td rowspan="2" style="width: 30px; height: 30px; text-align: center;">P.O</td> <td colspan="16" style="text-align: center;">Week</td> </tr> <tr> <td style="width: 20px; text-align: center;">1</td> <td style="width: 20px; text-align: center;">2</td> <td style="width: 20px; text-align: center;">3</td> <td style="width: 20px; text-align: center;">4</td> <td style="width: 20px; text-align: center;">5</td> <td style="width: 20px; text-align: center;">6</td> <td style="width: 20px; text-align: center;">7</td> <td style="width: 20px; text-align: center;">8</td> <td style="width: 20px; text-align: center;">9</td> <td style="width: 20px; text-align: center;">10</td> <td style="width: 20px; text-align: center;">11</td> <td style="width: 20px; text-align: center;">12</td> <td style="width: 20px; text-align: center;">13</td> <td style="width: 20px; text-align: center;">14</td> <td style="width: 20px; text-align: center;">15</td> <td style="width: 20px; text-align: center;">16</td> </tr> </table>								P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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Short Course Description	This course is an understanding of metal forming processes without sharpening including casting, rolling, extrusion, forging, spinning, and welding.																																							
References	Main :																																							
	1. [1] Schonmetz, Ing Alois. 1985. Pengerjaan dengan Tangan dan Mesin Sederhana. Bandung: Angkasa. 2. [2] Surdia, Tata. 1986. Teknik Pengecoran Logam. Jakarta: Pradnya Paramita. 3. [3] Syam, Suprpti. 1986. Teknologi Pengolahan Bahan. Surabaya: ITS. 4. [4] Siswosuwarno, Mardjono. Teknik Pembentukan Logam. Jurusan Mesin - ITB. 5. [5] Mulyana, Achmad. Teknik Pembentukan. Jurusan Teknik Mesin - ITS. 6. [6] Schey, John A., (1987). Introduction to Manufacturing Process, 2nd edition, Mc Graw-Hill Book Co																																							
	Supporters:																																							
Supporting lecturer	Arya Mahendra Sakti, S.T., M.T. 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	Understand what is meant by casting, forming, machining, welding, heat treatment, surface treatment	according to the rubric	Criteria: According to the Rubric	Lectures, discussions, questions and answers 150			0%
2	Understand the working process based on working temperature, based on forming style, based on workpiece shape, based on product stages	according to the rubric	Criteria: According to the Rubric	Lectures, discussions, questions and answers 150			0%
3	Understanding Deformation Mechanisms, Understanding elastic and plastic deformation, Micro deformation, Slip mechanism, Understanding Deformation Mechanism, Understanding elastic and plastic deformation, Micro deformation, Slip mechanism, dislocation theory	according to the rubric	Criteria: According to the Rubric	Lectures, discussions, questions and answers 300			0%
4	Understanding the properties of metals at low temperatures, the effect of heating after cold working, the effect of deformation on recrystallization temperature, the effect of deformation and heating on grain size, the effect of heating on mechanical properties, the effect of cold working on metal properties	according to the rubric	Criteria: According to the Rubric	Lectures, discussions, questions and answers 300			0%
5	Understanding the properties of metals at low temperatures, the effect of heating after cold working, the effect of deformation on recrystallization temperature, the effect of deformation and heating on grain size, the effect of heating on mechanical properties, the effect of cold working on metal properties	according to the rubric	Criteria: According to the Rubric	Lectures, discussions, questions and answers 300			0%
6	Understanding the properties of metals at high temperatures, the effect of deformation on recrystallization temperature, the effect of deformation and heating on grain size, the effect of heating on mechanical properties, the purpose of hot working, the softening mechanism in hot working	according to the rubric	Criteria: According to the Rubric	Lectures, discussions, questions and answers 300			0%

7	Understanding the properties of metals at high temperatures, the effect of deformation on recrystallization temperature, the effect of deformation and heating on grain size, the effect of heating on mechanical properties, the purpose of hot working, the softening mechanism in hot working	according to the rubric	Criteria: According to the Rubric	Lectures, discussions, questions and answers 300			0%
8	USS (attached)	USS (attached)	Criteria: USS (attached)	USS (attached) USS (attached)			0%
9	Understanding metal flow stress, understanding flow stress, mechanical testing, tensile test, compression test, torsion test, effect of strain, effect of temperature, effect of strain rate, flow stress in cold working, flow stress at high temperatures Understanding metal flow stress, understanding flow stress, mechanical testing, tensile test, compression testing, torsion testing, influence of strain, influence of temperature, influence of strain rate, flow stress in cold working, flow stress at high temperatures Understanding metal flow stress, understanding flow stress, mechanical testing, tensile test, test compression, torsional test, effect of strain, effect of temperature, effect of strain rate, flow stress in cold working, flow stress at high temperatures Understanding metal flow stress, understanding flow stress, mechanical testing, tensile test, compression test, torsion test, influence of strain, effect of temperature, effect of strain rate, flow stress in cold working, flow stress at high temperatures Understanding metal flow stress, understanding flow stress, mechanical testing, tensile test, compression test, torsion test, influence of strain, effect of temperature, effect of strain rate, flow stress in cold working, flow stress at high temperatures	according to the rubric	Criteria: According to the Rubric	Lectures, discussions, questions and answers 300			0%

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	stress at high temperatures Understanding metal flow stress, understanding flow stress, mechanical testing, tensile test, compression test, torsion test, effect of strain, effect of temperature, effect of strain rate, flow stress in cold working, flow stress in high temperature Understanding metal flow stress, understanding flow stress, mechanical testing, tensile test, compression test, torsion test, effect of strain, effect of temperature, effect of strain rate, flow stress in cold working, flow stress at high temperature						
11	Understand the analysis of forming forces, deformation areas and deformation patterns, Elementer theory or slab method, energy method Understand the analysis of forming forces, deformation areas and deformation patterns, Elementer theory or slab method, energy method	according to the rubric	Criteria: According to the Rubric	Lectures, discussions, questions and answers 150			0%
12	Understand the theory of plasticity, the difference between the plastic region and the elastic region, the stress-strain relationship in the elastic region, the stress-strain relationship in the plastic region	according to the rubric	Criteria: According to the Rubric	Lectures, discussions, questions and answers 150			0%
13	Understand the extrusion process, extrusion of round bars through a tapered die, extrusion of strip shapes through a die with a fixed die angle, determination of extrusion force with homogeneous deformation work	according to the rubric	Criteria: According to the Rubric	Lectures, discussions, questions and answers 200			0%
14	Understand the sheet metal forming process, scissor process, bending process, deep drawing, stretching	according to the rubric	Criteria: According to the Rubric	Lectures, discussions, questions and answers 200			0%
15	Understand the process of rolling, forging	according to the rubric	Criteria: According to the Rubric	Lectures, discussions, questions and answers 100			0%
16							0%

Evaluation Percentage Recap: Project Based Learning

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.