



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

Document  
Code

## SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date																																										
<b>Metal Forming and Casting Techniques</b>	8320302211	Compulsory Study Program Subjects	T=2	P=0	ECTS=3.18	3	January 17, 2023																																										
<b>AUTHORIZATION</b>		<b>SP Developer</b>	<b>Course Cluster Coordinator</b>			<b>Study Program Coordinator</b>																																											
		Ali Hasbi Ramadani, M.Pd.; Dr. Yunus, M.Pd, Dr. Djoko, M.Pd, Arif Irfa'i, M.T.	Dr. Yunus, M.Pd			Ir. Wahyu Dwi Kurniawan, S.Pd., M.Pd.																																											
<b>Learning model</b>	<b>Project Based Learning</b>																																																
<b>Program Learning Outcomes (PLO)</b>	<b>PLO study program which is charged to the course</b>																																																
	<b>PLO-10</b>	Have an understanding of mathematics and basic mechanical engineering																																															
	<b>Program Objectives (PO)</b>																																																
	<b>PLO-PO Matrix</b>																																																
		<table border="1" style="margin: auto;"> <tr> <td style="width: 50px;">P.O</td> <td style="width: 50px;">PLO-10</td> </tr> </table>						P.O	PLO-10																																								
P.O	PLO-10																																																
	<b>PO Matrix at the end of each learning stage (Sub-PO)</b>																																																
	<table border="1" style="margin: auto;"> <tr> <td rowspan="2" style="width: 30px;">P.O</td> <td colspan="16" style="text-align: center;">Week</td> </tr> <tr> <td style="width: 20px;">1</td> <td style="width: 20px;">2</td> <td style="width: 20px;">3</td> <td style="width: 20px;">4</td> <td style="width: 20px;">5</td> <td style="width: 20px;">6</td> <td style="width: 20px;">7</td> <td style="width: 20px;">8</td> <td style="width: 20px;">9</td> <td style="width: 20px;">10</td> <td style="width: 20px;">11</td> <td style="width: 20px;">12</td> <td style="width: 20px;">13</td> <td style="width: 20px;">14</td> <td style="width: 20px;">15</td> <td style="width: 20px;">16</td> </tr> </table>																P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
P.O	Week																																																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																																	
<b>Short Course Description</b>	This course is an understanding of metal forming processes without sharpening including casting, rolling, extrusion, forging, spinning, and welding.																																																
<b>References</b>	<b>Main :</b>																																																
	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.																																																
	<b>Supporters:</b>																																																
	1. [5] Mulyana, Achmad. Teknik Pembentukan. Jurusan Teknik Mesin - ITS. 2. [6] Schey, John A., (1987). Introduction to Manufacturing Process, 2nd edition, Mc Graw-Hill Book Co																																																
<b>Supporting lecturer</b>	Ali Hasbi Ramadani, S.Pd., M.Pd.																																																
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	<b>Criteria:</b> According to the Rubric  <b>Form of Assessment :</b> Participatory Activities	Lectures, discussions, questions and answers 2x50	Lectures, discussions, questions and answers 2x50	<b>Material:</b> formation <b>References:</b> [5] Mulyana, Achmad. <i>Forming Techniques.</i> Department of Mechanical Engineering - ITS.	5%
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	<b>Criteria:</b> According to the Rubric  <b>Form of Assessment :</b> Participatory Activities, Portfolio Assessment	case studies, discussions, questions and answers., assignments 2 x 50	case studies, discussions, questions and answers., assignments 2 x 50	<b>Material:</b> formation <b>References:</b> [1] Schonmetz, Ing Alois. 1985. <i>Working by Hand and Simple Machines.</i> Bandung: Space.	5%
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	<b>Criteria:</b> According to the Rubric  <b>Form of Assessment :</b> Participatory Activities, Portfolio Assessment	Lectures, discussions, questions and answers 2 x 50	Lectures, discussions, questions and answers 2 x 50	<b>Material:</b> formation <b>References:</b> [5] Mulyana, Achmad. <i>Forming Techniques.</i> Department of Mechanical Engineering - ITS.	5%
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	<b>Criteria:</b> According to the Rubric  <b>Form of Assessment :</b> Participatory Activities, Portfolio Assessment	Lectures, discussions, questions and answers 2 x 50	Lectures, discussions, questions and answers 2 x 50	<b>Material:</b> formation <b>References:</b> [5] Mulyana, Achmad. <i>Forming Techniques.</i> Department of Mechanical Engineering - ITS.	5%
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	<b>Criteria:</b> According to the Rubric  <b>Form of Assessment :</b> Participatory Activities, Tests	Case studies, discussions, questions and answers, assignments 2 x 50	Case studies, discussions, questions and answers, assignments 2 x 50	<b>Material:</b> formation <b>References:</b> [5] Mulyana, Achmad. <i>Forming Techniques.</i> Department of Mechanical Engineering - ITS.	5%

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	<b>Criteria:</b> According to the Rubric  <b>Form of Assessment :</b> Participatory Activities, Portfolio Assessment	Case studies, discussions, questions and answers, assignments 2 x 50	Case studies, discussions, questions and answers, assignments 2 x 50	<b>Material:</b> formation <b>References:</b> [4] Siswosuwarno, Mardjono. <i>Metal Forming Techniques</i> . Department of Engineering - ITB.	5%
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	<b>Criteria:</b> According to the Rubric  <b>Form of Assessment :</b> Participatory Activities, Tests	Case studies, discussions, questions and answers, assignments 2 x 50	Case studies, discussions, questions and answers, assignments 2 x 50	<b>Material:</b> formation <b>References:</b> [1] Schonmetz, Ing Alois. 1985. <i>Working by Hand and Simple Machines</i> . Bandung: Space.	5%
8	UTS	USS (attached)	<b>Criteria:</b> USS (attached)	USS UTS (attached)		<b>Material:</b> Material 1-7 <b>References:</b> [1] Schonmetz, Ing Alois. 1985. <i>Working by Hand and Simple Machines</i> . Bandung: Space.	10%
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	according to the rubric	<b>Criteria:</b> According to the Rubric  <b>Form of Assessment :</b> Participatory Activities	Case studies, discussions, questions and answers, assignments 2 x 50	Case studies, discussions, questions and answers, assignments 2 x 50	<b>Material:</b> material properties <b>References:</b> [3] Syam, Suprapti. 1986. <i>Material Processing Technology</i> . Surabaya: ITS.	5%
10	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	according to the rubric	<b>Criteria:</b> According to the Rubric  <b>Form of Assessment :</b> Participatory Activities, Tests	Case studies, discussions, questions and answers, assignments 2 x 50	Case studies, discussions, questions and answers, assignments 2 x 50	<b>Material:</b> material testing <b>References:</b> [6] Schey, John A., (1987). <i>Introduction to Manufacturing Process, 2nd edition</i> , Mc Graw-Hill Book Co	5%

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	<b>Criteria:</b> According to the Rubric  <b>Form of Assessment :</b> Participatory Activities	Case studies, discussions, questions and answers, assignments 2 x 50	Case studies, discussions, questions and answers, assignments 2 x 50	<b>Material:</b> properties of metal materials <b>References:</b> [2] <i>Surdia, Tata. 1986. Metal Casting Techniques. Jakarta: Pradnya Paramita.</i>	5%
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	<b>Criteria:</b> According to the Rubric  <b>Form of Assessment :</b> Participatory Activities	Case studies, discussions, questions and answers, assignments 2 x 50	Case studies, discussions, questions and answers, assignments 2 x 50	<b>Material:</b> properties of metallic materials <b>Reference:</b> [6] <i>Schey, John A., (1987). Introduction to Manufacturing Process, 2nd edition, Mc Graw-Hill Book Co</i>	5%
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	<b>Criteria:</b> According to the Rubric  <b>Form of Assessment :</b> Participatory Activities, Tests	Case studies, discussions, questions and answers, assignments 2 x 50	Case studies, discussions, questions and answers, assignments 2 x 50	<b>Material:</b> extrusion <b>References:</b> [6] <i>Schey, John A., (1987). Introduction to Manufacturing Process, 2nd edition, Mc Graw-Hill Book Co</i>	5%
14	Understand the sheet metal forming process, scissor process, bending process, deep drawing, stretching	according to the rubric	<b>Criteria:</b> According to the Rubric  <b>Form of Assessment :</b> Test	Case studies, discussions, questions and answers, assignments 2 x 50	Case studies, discussions, questions and answers, assignments 2 x 50	<b>Material:</b> drawing <b>References:</b> [2] <i>Surdia, Tata. 1986. Metal Casting Techniques. Jakarta: Pradnya Paramita.</i>	5%
15	Understand the process of rolling, forging	according to the rubric	<b>Criteria:</b> According to the Rubric  <b>Form of Assessment :</b> Participatory Activities, Tests	Case studies, discussions, questions and answers, assignments 2 x 50	Case studies, discussions, questions and answers, assignments 2 x 50	<b>Material:</b> rolling <b>References:</b> [2] <i>Surdia, Tata. 1986. Metal Casting Techniques. Jakarta: Pradnya Paramita.</i>	5%
16	UAS	Compliance with the answer key	<b>Criteria:</b> Assessment rubric  <b>Form of Assessment :</b> Participatory Activities	UAS 2 x 50	UAS 2 x 50	<b>Material:</b> All material <b>References:</b> [1] <i>Schonmetz, Ing Alois. 1985. Working by Hand and Simple Machines. Bandung: Space.</i>	20%

#### Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	62.5%
2.	Portfolio Assessment	10%
3.	Test	17.5%
		90%

## 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.