



**Universitas Negeri Surabaya  
Vocational Faculty,  
D4 Mechanical Engineering Study Program**

Document Code

**SEMESTER LEARNING PLAN**

Courses	CODE	Course Family	Credit Weight	SEMESTER	Compilation Date
Manufacturing Process II	2130204032		T=4 P=0 ECTS=6.36	4	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Arya Mahendra Sakti, S.T., M.T.

Learning model	Case Studies
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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: 50px; height: 20px;">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: 50px; height: 20px;">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																		

Short Course Description	Understanding and practice of welding processes in the form of strip welding, overlapping joints, fillet joints, I-joints, V-joints and pipes with underhand, horizontal and vertical welding positions using acetylene welding, electric arc welding and MIG welding.
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References	<p><b>Main :</b></p> <ol style="list-style-type: none"> <li>1. Mikell P. Groover. 2012. Introduction to Manufacturing Processes. John Wiley and Sons.</li> <li>2. Sindo Kou. 2003. Welding Metallurgy Second Edition. New Jersey: John Wiley and Sons.</li> <li>3. Harsono Wiryosumarto dan Toshie Okumura. 2000. Teknologi Pengelasan Logam . Jakarta : Pradnya Paramita.</li> <li>4. Noer Ilman. 2011. Diktat Teknologi Las. Yogyakarta : Universitas Gadjah Mada.</li> <li>5. Lukas Okta Prasetyawanto. 2012. Ringkasan Materi Sub Bidang Pengelasan SMAW. Serang : Dikdas Teknologi Mekanik Balai Besar Latihan Kerja Industri.</li> <li>6. Budiharjo dan Novi Sukma Drastiawati. 2014. Job Sheet Las Listrik SMAW. Surabaya : UNESA.</li> </ol> <p><b>Supporters:</b></p>
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Supporting lecturer	Dr. Yunus, M.Pd. Arya Mahendra Sakti, S.T., M.T. Akhmad Hafizh Ainur Rasyid, S.T., M.T.
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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	<p>Understand the one semester study contract Understand the meaning of the manufacturing process Understand welding as part of the manufacturing process Understand the history of welding Understand the definition of welding Understand the advantages of welding compared to other connection processes Understand the use of welding</p>	<p>Agree to a study contract for one semester Explain the meaning of the manufacturing process Explain the welding process which is part of the manufacturing process Create a welding chart as part of the manufacturing process Explain the history of welding Explain the definition of welding Explain the advantages of welding compared to other connection processes Explain the use of welding in general Explain the use of welding in the industrial world</p>	<p><b>Criteria:</b> The weight of the assessment results of 20% is obtained from the level of student participation both in terms of attendance at lectures, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations. The following is a class presentation rubric.</p>	<p>Lectures, discussions and questions and answers 2 X 50</p>			0%
2	<p>Continuing the 1st meeting (same as the 1st meeting)</p>	<p>Able to explain the history of welding. Explain the definition of welding. Explain the advantages of welding compared to other connection processes</p>	<p><b>Criteria:</b> The weight of the assessment results of 20% is obtained from the level of student participation both in terms of attendance at lectures, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations. The following is a class presentation rubric.</p>	<p>Lectures, discussions and questions and answers 2 X 50</p>			0%

3	<p>Understanding the types of welding  Understanding welding methods  Understanding the various types of welding joints  Understanding liquid chemical welding  Understanding oxy acetylene welding (OAW)  Understanding thermite welding  Understanding electric arc welding  Understanding electric resistance welding</p>	<p>Explaining the various types of welding  Classifying the various types of welding  Explaining welding methods  Describing welding methods  Explaining liquid chemical welding  Explaining OAW welding  Describing how OAW welding works  Explaining thermite welding  Explaining SMAW welding  Describing the SMAW welding process  Explaining the definition of MIG and TIG welding  Describe the welding process</p>	<p><b>Criteria:</b>  The weight of the assessment results of 20% is obtained from the level of student participation both in terms of attendance at lectures, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations. The following is a class presentation rubric.</p>	<p>Lectures, discussions, questions and answers, and problem solving (case studies)  2 X 50</p>			0%
4	<p>Understanding friction welding  Understanding energy beam welding  Understanding heat transfer in welding  Understanding the calculation of heat input and heat output in welding</p>	<p>Explain friction welding  Describe the friction welding method  Define various types of friction welding  Explain energy beam welding  Define energy beam welding  Explain heat transfer in the welding process  Describe heat transfer in the welding process</p>	<p><b>Criteria:</b>  The weight of the assessment results of 20% is obtained from the level of student participation both in terms of attendance at lectures, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations. The following is a class presentation rubric</p>	<p>Lectures, discussions, questions and answers, and 2 X 50 case studies</p>			0%
5	<p>Understanding welding electrodes  Understanding welding on several types of metal</p>	<p>Explaining the various types of welding electrodes  Explaining how to determine welding electrodes  Explaining how to read symbols on welding electrodes  Explaining welding on several types of metal  Explaining welding capabilities on metal alloys</p>	<p><b>Criteria:</b>  The weight of the assessment results of 20% is obtained from the level of student participation both in terms of attendance at lectures, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations. The following is a class presentation rubric</p>	<p>Lectures, discussions, questions and answers, and 2 X 50 case studies</p>			0%

6	Understanding the types of welding joints Understanding welding positions Understanding defects in welding	Explain all types of welding joints Describe the types of welding joints Explain welding positions Describe welding positions Explain weld defects Classify weld defects Describe weld defects	<b>Criteria:</b> The weight of the assessment results of 20% is obtained from the level of student participation both in terms of attendance at lectures, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations. The following is a class presentation rubric.	Lectures, discussions and questions and answers 2 X 50			0%
7	Understand the welding planning process. Understand work safety in welding	Explain the welding planning process Explain the correct welding planning procedure Explain work safety when welding Explain the safety equipment that must be needed when welding Explain some of the dangers of welding that do not comply with procedures	<b>Criteria:</b> The weight of the assessment results of 20% is obtained from the level of student participation both in terms of attendance at lectures, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations. The following is a class presentation rubric	Lectures, discussions, questions and answers, and 2 X 50 case studies			0%
8	Understand welding procedures and techniques	Explain welding procedures Explain welding techniques Explain welding preparation in detail	<b>Criteria:</b> The weight of the assessment results of 20% is obtained from the level of student participation both in terms of attendance at lectures, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations. The following is a class presentation rubric.	Lectures, discussions, questions and answers, and 2 X 50 case studies			0%
9	midterm exam	midterm exam	<b>Criteria:</b> midterm exam	midterm exam 2 X 50			0%
10	Understand the use of welding in construction	Welding in ship construction Welding in the construction of bridges and steel frames Explaining the use of welding in construction Classifying the use of welding in construction Describing the various uses of welding in construction	<b>Criteria:</b> The weight of the assessment results of 20% is obtained from the level of student participation both in terms of attendance at lectures, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations. The following is a class presentation rubric	Lectures, discussions, questions and answers, and 2 X 50 case studies			0%

11	Understand the machines used for welding practice. Understand how to set welding equipment (SMAW or electric welding and OAW or carbide welding)	d Explain the machines used for welding practice Classify the machines used for welding practice Identify parts of the machines used for welding practice (SMAW welding machines and OAW welding machines) Practicing the ignition steps on welding machines (SMAW and OAW) Practicing how to set O2 and C2H2	<b>Criteria:</b> The weight of the assessment results of 20% is obtained from the level of student participation both in terms of attendance at lectures, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations. The following is a class presentation rubric.	Lectures, Discussions and Practicum 2 X 50			0%
12	Understand how to perform SMAW welding. Understand how to make paths in SMAW welding	MPracticing SMAW welding Practicing how to perform initial ignition (arc) Identifying errors when performing initial ignition Practicing making welding lines Identifying welding results Identifying welding defects	<b>Criteria:</b> The weight of the assessment results of 20% is obtained from the level of student participation both in terms of attendance at lectures, activeness in attending lectures (asking questions, paying attention, and being serious), and activeness in group discussion activities and class presentations. The following is a class presentation rubric.	practical discussion 2 X 50			0%
13	Understanding how to set tools for SMAW welding Understanding how to perform SMAW welding Making welding lines for SMAW welding	MPracticing SMAW welding Practicing how to perform initial ignition (arc) MIdentifying errors when performing initial ignition Practicing making welding lines Identifying welding results Identifying welding defects	<b>Criteria:</b> The maximum score is if the student is able to set the tool, turn on the tool, and make a good welding line	Practical Discussion 2 X 50			0%
14	Understand how to perform OAW welding. Understand the results of OAW welding	MAble to carry out OAW welding practicum Able to make welding lines on workpieces Able to connect workpieces Able to identify OAW weld results (connected well or not)	<b>Criteria:</b> The maximum score is obtained if the student is able to carry out the practicum well	Practical Discussion 2 X 50			0%

15	Understand how to perform OAW welding. Understand the results of OAW welding	MABLE to carry out OAW welding practicum Able to make welding lines on workpieces Able to connect workpieces Able to identify OAW weld results (connected well or not)	<b>Criteria:</b> The maximum score is obtained if the student is able to carry out the practicum well	Practical Discussion 2 X 50			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.**