



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

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight	SEMESTER	Compilation Date
Pract. Basics of Mechanical Technology	2030502035		T=2 P=0 ECTS=3.18	4	January 2, 2023
AUTHORIZATION	SP Developer		Course Cluster Coordinator	Study Program Coordinator	
	Dr. Joko, M.Pd. MT.		Mahendra Widyartono, S.T., M.T.	

Learning model	Project Based Learning																																																		
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																																		
	PLO-9 Apply theoretical concepts of natural science, applications of engineering mathematics; engineering principles, engineering science and engineering design required for analysis and design of systems, processes, products or components in electric power systems.																																																		
	PLO-10 Carrying out procedural and operational workshop work and laboratory activities as well as implementing occupational safety and health (K3) which refers to the SHE (safety, health and environment) concept, and so on.																																																		
	Program Objectives (PO)																																																		
	PO - 1 Students are able to work in collaborative groups and be responsible independently for basic work in the field of electrical engineering using mechanical technology and hand power tools, 2. Students are able to operate machine tools, 3. Students are able to explain and demonstrate basic knowledge of mechanical technology equipment appropriate for a job, process or production operation																																																		
	PLO-PO Matrix																																																		
	<table border="1" style="margin: auto;"> <tr> <td>P.O</td> <td>PLO-9</td> <td>PLO-10</td> </tr> <tr> <td>PO-1</td> <td></td> <td></td> </tr> </table>	P.O	PLO-9	PLO-10	PO-1																																														
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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">P.O</td> <td colspan="16">Week</td> </tr> <tr> <td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td> </tr> <tr> <td>PO-1</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table>	P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	PO-1																
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PO-1																																																			

Short Course Description Identifying types of mechanical or hand work equipment and hand power tools, parts, how to use them, functions and how to care for them to be used in solving problems in making electrical cable connection and soldering products, making electrical panel boxes and supporting components in accordance with applicable regulations , healthy and safe as well as honest and responsible

References

Main :

- Rizqi Ilmal Y., Juniawan P. Siahaan, 2023. Teknologi mekanik dalam praktikum. Bandung, Widina Bhakti Persada
- Erol F. Sumolang, 2017. Modul kerja bangku, pipa dan plat. Politenik Negeri Manado
- Tim, 2013. Pekerjaan dasar elektromekanik. Jakarta, Kemdikbud
- Agung S., 2013. Teknologi mekanik. Jakarta, Kemdikbud

Supporters:

- Peraturan menteri ketenagakerjaan nomor 12 tahun 2015
- Joko, 2023. Handout menerapkan K3 sesuai manual SOP pekerjaan elektomekanik. Teknik Elektro FT Unesa
- Joko, 2023 Peralatan elektromekanik elektronika. Rumpun Teknik Elektro FT Unesa
- Paul Mueller, 2020. LMS 11-3 Hand Soldering, Electrical
- Soldering, 2016. University of Technology Sydney
- PUIL Tahun 2011
- Niia A., Syaad M., S. Wibawanto Modul digital "komponen mekanik pekerjaan dasar elektromekanik (kabel listrik)". Malang, Universitas Negeri Malang
- Bob Mercer, 2011. Industrial Control Wiring Guide Second edition. Oxford Auckland Boston Johannesburg Melbourne New Delh

Supporting lecturer Prof. Dr. Joko, M.Pd., M.T.

Week-	Final abilities of each learning	Evaluation	Help Learning, Learning methods, Student Assignments, [Estimated time]	Learning materials	Assessment Weight (%)
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	stage (Sub-PO)	Indicator	Criteria & Form	Offline (<i>offline</i>)	Online (<i>online</i>)	[References]	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1	Able to use hand tools and hand power tools to carry out soldering work on electrical and electronic component connections according to SOP	<p>1.Students behave and behave safely at work, carry out workplace maintenance actions, create a safe work environment, use correct clothing and equipment appropriate to work conditions, and make reports</p> <p>2.Participative</p> <p>3.Correct behavior and attitude at work, workplace maintenance actions taken, creation of work environment, correct use of clothing and equipment according to work, and reports made, max score 50%</p>	<p>Criteria:</p> <p>1.Accuracy in explaining K3 concepts, determining K3 equipment in the field of electromechanical work, and identifying K3 equipment based on its function, max score. 50%</p> <p>2.Participative, min score 50%</p> <p>Forms of Assessment : Participatory Activities, Portfolio Assessment, Practice / Performance</p>	Lecturer's short presentation and discussion; assignment of students as a group to demonstrate safe work practices, including safe behavior and attitudes at work, taking care of the workplace, creating a safe work environment, using correct clothing and equipment appropriate to work conditions; and reflect. The results of the work training demonstration are reported and uploaded to Google Drive individually 2 X 50		<p>Material: Electrical occupational safety and health in the workplace</p> <p>Reference: <i>Minister of Manpower Regulation number 12 of 2015 concerning electrical occupational safety and health in the workplace</i></p> <hr/> <p>Material: Applying K3 according to the manual for standard operating procedures in the field of electromechanical work.</p> <p>Reference: <i>Joko, 2023. Handout for implementing K3 according to the manual for standard operating procedures in the field of electromechanical work. Electrical Engineering Cluster, Faculty of Engineering, Unesa</i></p> <hr/> <p>Material: Electrical occupational safety and health in the workplace</p> <p>Reference: <i>Minister of Manpower Regulation number 12 of 2015</i></p>	3%

2	Able to demonstrate the use of various types of hand tools and hand power tools for base plate work and basic mechanical electrical engineering work	1.Students demonstrate the use of various types of hand tools and hand power tools for plate work and basic electrical engineering work, and make reports 2.Participative	Criteria: 1.Accuracy in demonstrating the use of types of hand tools and hand power tools and reports created, max score. 50% 2.Participative, min score 50% Form of Assessment : Participatory Activities, Practice/Performance	Lecturer's short presentation and discussion; group assignments demonstrate the use of types of hand tools and hand power tools for plate work and basic electrical engineering work, and make reports; and reflect. The results report demonstrating the use of the tool is uploaded to Google Drive for each student 2 X 50		Material: Mechanical technology equipment (hand) Reference: Rizqi Ilmal Y., Juniawan P. Sahaan, 2023. <i>Mechanical technology in practicum.</i> Bandung, Widina Bhakti Persada Material: Hand tools for plate work and component assembly Reference: Team, 2013. <i>Basic electromechanical work.</i> Jakarta, Ministry of Education and Culture Material: Plate working equipment Reference: Agung S., 2013. <i>Mechanical technology.</i> Jakarta, Ministry of Education and Culture Material: Making types of cable connections References: Nlia A., Syaad M., S. Wibawanto <i>Digital module "mechanical components for basic electromechanical work (electrical cables)".</i> Malang, State University of Malang Material: Soldering and soldering equipment Reference: Paul Mueller, 2020. <i>LMS 11-3 Hand Soldering, Electrical</i> Material: Hand tools and hand power tools Reference: Agung S., 2013. <i>Mechanical technology.</i> Jakarta, Ministry of Education and Culture	3%
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3	Able to demonstrate the use of various types of hand tools and hand power tools for base plate work and basic mechanical electrical engineering work	<p>1. Students demonstrate the use of various types of hand tools and hand power tools for plate work and basic electrical engineering work, and make reports</p> <p>2. Participative</p>	<p>Criteria:</p> <p>1. Accuracy in demonstrating the use of types of hand tools and hand power tools and reports created, max score. 50%</p> <p>2. Participative, min score 50%</p> <p>Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Practical Assessment, Practical / Performance</p>	Lecturer's short presentation and discussion; group assignments demonstrate the use of types of hand tools and hand power tools for plate work and basic electrical engineering work, and make reports; and reflect. The results report demonstrating the use of the tool is uploaded to Google Drive for each student 2 X 50		<p>Material: Mechanical technology equipment (hand)</p> <p>Reference: Rizqi Ilmal Y., Juniawan P. Siahaan, 2023. <i>Mechanical technology in practicum.</i> Bandung, Widina Bhakti Persada</p> <hr/> <p>Material: Hand tools for plate work and component assembly</p> <p>Reference: Team, 2013. <i>Basic electromechanical work.</i> Jakarta, Ministry of Education and Culture</p> <hr/> <p>Material: Plate working equipment</p> <p>Reference: Agung S., 2013. <i>Mechanical technology.</i> Jakarta, Ministry of Education and Culture</p> <hr/> <p>Material: Making types of cable connections</p> <p>References: Nlia A., Syaad M., S. Wibawanto <i>Digital module "mechanical components for basic electromechanical work (electrical cables)".</i> Malang, State University of Malang</p> <hr/> <p>Material: Soldering and soldering equipment</p> <p>Reference: Paul Mueller, 2020. <i>LMS 11-3 Hand Soldering, Electrical</i></p> <hr/> <p>Material: Hand tools and hand power tools</p> <p>Reference: Agung S., 2013. <i>Mechanical technology.</i> Jakarta, Ministry of Education and Culture</p>	3%
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4	Students are able to use hand tools and hand power tools to make projects on various types of electrical cable connections and do soldering	<p>1. Students determine the project topic, create a work schedule, create a design, work on a project using hand tools and hand power tools, carry out product testing (neatness, size, contact resistance of connections and soldering, time to complete the project), make an oral/written report, and reflect.</p> <p>2. Participation</p>	<p>Criteria:</p> <p>1. Accuracy of the project topic, work schedule, designs made, use of hand tools and hand power tools to work on the project, testing of product results (neatness, size, contact resistance of cable connections and soldering, time used), reports made, and reflection results, max score 50%</p> <p>2. Participative, min score 50%</p> <p>Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Practical Assessment, Practical / Performance</p>	Short presentations and discussions, assignments to search for sources of information and group discussions and create projects on types of electrical cable connections and soldering using hand tools and hand power tools, carry out equipment maintenance, report work results; and reflection. The work report is uploaded to Google Drive individually 2 X 50		<p>Material: Making various types of electrical cable connections. Reference: Nia A., Syaad M., S. Wibawanto. <i>Basic electromechanical work of electrical cables.</i> Malang, State University of Malang</p> <hr/> <p>Material: Soldering Reader: Paul Mueller, 2020. <i>LMS 11-3 Hand Soldering, Electrical</i></p> <hr/> <p>Material: Soldering and soldering Reference: Soldering, 2016. <i>University of Technology Sydney</i></p> <hr/> <p>Material: Connection contact measurements Reference: PUIL 2011</p> <hr/> <p>Material: Bench work equipment Reference: Erol F. Sumolang, 2017. <i>Bench, pipe and plate work module.</i> Manado State Polytechnic</p> <hr/> <p>Material: Cable connection Reference: Bob Mercer, 2011. <i>Industrial Control Wiring Guide Second edition.</i> Oxford Auckland Boston Johannesburg Melbourne New Delh</p>	4%
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5	Students are able to use hand tools and hand power tools to make projects on various types of electrical cable connections and do soldering	<p>1. Students determine the project topic, create a work schedule, create a design, work on a project using hand tools and hand power tools, carry out product testing (neatness, size, contact resistance of connections and soldering, time to complete the project), make an oral/written report, and reflect.</p> <p>2. Participation</p>	<p>Criteria:</p> <p>1. Accuracy of the project topic, work schedule, designs made, use of hand tools and hand power tools to work on the project, testing of product results (neatness, size, contact resistance of cable connections and soldering, time used), reports made, and reflection results, max score 50%</p> <p>2. Participative, min score 50%</p> <p>Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Practical Assessment, Practical / Performance</p>	Short presentations and discussions, assignments to search for sources of information and group discussions and create projects on types of electrical cable connections and soldering using hand tools and hand power tools, carry out equipment maintenance, report work results; and reflection. The work report is uploaded to Google Drive individually 2 X 50		<p>Material: Making various types of electrical cable connections. Reference: Nia A., Syaad M., S. Wibawanto. <i>Basic electromechanical work of electrical cables.</i> Malang, State University of Malang</p> <hr/> <p>Material: Soldering Reader: Paul Mueller, 2020. <i>LMS 11-3 Hand Soldering, Electrical</i></p> <hr/> <p>Material: Soldering and soldering Reference: Soldering, 2016. <i>University of Technology Sydney</i></p> <hr/> <p>Material: Connection contact measurements Reference: PUIL 2011</p> <hr/> <p>Material: Bench work equipment Reference: Erol F. Sumolang, 2017. <i>Bench, pipe and plate work module.</i> Manado State Polytechnic</p> <hr/> <p>Material: Cable connection Reference: Bob Mercer, 2011. <i>Industrial Control Wiring Guide Second edition.</i> Oxford Auckland Boston Johannesburg Melbourne New Delh</p>	5%
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6	Able to use techniques and mark plate/metal workpieces using measuring tools and hand tools	1. Interpret wireframe drawings, determine tools for marking workpieces, and procedures for marking metal workpieces 2. Participation	Criteria: 1. Accuracy: project topic, schedule, design, project work, student performance and product performance, oral/written reports, and reflection results, max score 50% 2. Participative, min score 50% Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Practical Assessment, Practical / Performance	Short presentations and discussions; group assignments to search for sources of information, discuss and carry out work using techniques and marking/drawing on plate/metal work objects using measuring instruments and hand tools, making reports; and reflect. Reports are uploaded to Google Drive by each student. 2 X 50		Material: Practical equipment Reference: Rizqi Ilmal Y., Juniawan P. Siahaan, 2023. <i>Mechanical technology in practical work.</i> Bandung, Widina Bhakti Persada Material: Bench work tools Reference: Erol F. Sumolang, 2017. <i>Bench, pipe and plate work modules.</i> Manado State Polytenik, Department of Mechanical Engineering Material: Preparing for metal work Reference: Team, 2013. <i>Basic electromechanical work.</i> Jakarta, Directorate General for Improving the Quality of Educators and Education Personnel, Ministry of Education and Culture	5%
7	Able to use techniques and mark plate/metal workpieces using measuring tools and hand tools	1. Interpret wireframe drawings, determine tools for marking workpieces, and procedures for marking metal workpieces 2. Participation	Criteria: 1. Accuracy: project topic, schedule, design, project work, student performance and product performance, oral/written reports, and reflection results, max score 50% 2. Participative, min score 50% Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Practical Assessment, Practical / Performance	Short presentations and discussions; group assignments to search for sources of information, discuss and carry out work using techniques and marking/drawing on plate/metal work objects using measuring instruments and hand tools, making reports; and reflect. Reports are uploaded to Google Drive by each student. 2 X 50		Material: Practical equipment Reference: Rizqi Ilmal Y., Juniawan P. Siahaan, 2023. <i>Mechanical technology in practical work.</i> Bandung, Widina Bhakti Persada Material: Bench work tools Reference: Erol F. Sumolang, 2017. <i>Bench, pipe and plate work modules.</i> Manado State Polytenik, Department of Mechanical Engineering Material: Preparing for metal work Reference: Team, 2013. <i>Basic electromechanical work.</i> Jakarta, Directorate General for Improving the Quality of Educators and Education Personnel, Ministry of Education and Culture	5%

8	UTS Material for meetings 1 to 7	Create PowerPoint, make presentations, conduct discussions/question and answer, perform, and revise PPT	<p>Criteria: Accuracy of the substance of the content and appearance of the PPT, accuracy of presentation, active discussion/question and answer, accuracy in answering lecturer questions. appearance, and PPT revision results, max score 50%</p> <p>Form of Assessment : Portfolio Assessment, Test</p>	UTS is carried out offline with a classic group presentation using PowerPoint compiled from the 1st-7th meeting report. Determination of the material each group presents will be drawn. Revised PPT based on input complete with questions and answers during discussion complete with documents, results of questions and answers, and answers to supervisors' questions uploaded to Google Drive 4 X 50			20%
9	Students are able to carry out project work on cutting, drilling, trimming, smoothing, plating and folding metal plates using hand tools and hand power tools	<ol style="list-style-type: none"> 1.students carry out cutting, drilling, trimming, smoothing and folding metal plates using hand tools and hand power tools and make reports 2.Participative 	<p>Criteria:</p> <ol style="list-style-type: none"> 1.Accuracy in size, harmony, neatness, smoothness of product results in cutting, drilling, trimming, smoothing, folding metal plates, including student performance in doing work and report quality, max score 50% 2.Participative, min score 50% <p>Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment, Practice / Performance</p>	Short presentations and discussions; group assignments to search for sources of information, discussions and cutting, drilling, plastering, smoothing, plating and folding metal plates using hand tools and hand power tools, making reports; and reflect. The results of the discussion conclusions are uploaded by each student on Google Drive 2 X 50		<p>Material: Working on metal plates Reference: <i>Team, 2013. Basic electromechanical work. Jakarta, Directorate General for Improving the Quality of Educators and Education Personnel, Ministry of Education and Culture</i></p> <hr/> <p>Material: Mechanical technology equipment Reference: <i>Rizqi Ilmal Y., Juniawan P. Siahaan, 2023. Mechanical technology in practicum. Bandung, Widina Bhakti Persada</i></p> <hr/> <p>Material: Plate work equipment Reference: <i>Erol F. Sumolang, 2017. Bench, pipe and plate work modules. Manado State Polytenik, Department of Mechanical Engineering</i></p> <hr/> <p>Material: Hand working equipment and hand power tools Reference: <i>Agung S., 2013. Mechanical technology. Jakarta, Ministry of Education and Culture</i></p>	3%

10	Students are able to carry out project work on cutting, drilling, trimming, smoothing, plating and folding metal plates using hand tools and hand power tools	1. students carry out cutting, drilling, trimming, smoothing and folding metal plates using hand tools and hand power tools and make reports 2. Participative	<p>Criteria:</p> <p>1. Accuracy in size, harmony, neatness, smoothness of product results in cutting, drilling, trimming, smoothing, folding metal plates, including student performance in doing work and report quality, max score 50%</p> <p>2. Participative, min score 50%</p> <p>Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Practices / Performance</p>	Short presentations and discussions; group assignments to search for sources of information, discussions and cutting, drilling, plastering, smoothing, plating and folding metal plates using hand tools and hand power tools, making reports; and reflect. The results of the discussion conclusions are uploaded by each student on Google Drive 2 X 50		<p>Material: Working on metal plates Reference: Team, 2013. <i>Basic electromechanical work.</i> Jakarta, Directorate General for Improving the Quality of Educators and Education Personnel, Ministry of Education and Culture</p> <hr/> <p>Material: Mechanical technology equipment Reference: Rizqi Ilmal Y., Juniawan P. Sahaan, 2023. <i>Mechanical technology in practicum.</i> Bandung, Widina Bhakti Persada</p> <hr/> <p>Material: Plate work equipment Reference: Erol F. Sumolang, 2017. <i>Bench, pipe and plate work modules.</i> Manado State Polytenik, Department of Mechanical Engineering</p> <hr/> <p>Material: Hand working equipment and hand power tools Reference: Agung S., 2013. <i>Mechanical technology.</i> Jakarta, Ministry of Education and Culture</p>	3%
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11	Students are able to carry out project work on cutting, drilling, trimming, smoothing, plating and folding metal plates using hand tools and hand power tools	1. students carry out cutting, drilling, trimming, smoothing and folding metal plates using hand tools and hand power tools and make reports 2. Participative	<p>Criteria:</p> <p>1. Accuracy in size, harmony, neatness, smoothness of product results in cutting, drilling, trimming, smoothing, folding metal plates, including student performance in doing work and report quality, max score 50%</p> <p>2. Participative, min score 50%</p> <p>Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Practical Assessment, Practical / Performance</p>	Short presentations and discussions; group assignments to search for sources of information, discussions and cutting, drilling, plastering, smoothing, plating and folding metal plates using hand tools and hand power tools, making reports; and reflect. The results of the discussion conclusions are uploaded by each student on Google Drive 2 X 50		<p>Material: Working on metal plates Reference: Team, 2013. <i>Basic electromechanical work.</i> Jakarta, Directorate General for Improving the Quality of Educators and Education Personnel, Ministry of Education and Culture</p> <hr/> <p>Material: Mechanical technology equipment Reference: Rizqi Ilmal Y., Juniawan P. Sahaan, 2023. <i>Mechanical technology in practicum.</i> Bandung, Widina Bhakti Persada</p> <hr/> <p>Material: Plate work equipment Reference: Erol F. Sumolang, 2017. <i>Bench, pipe and plate work modules.</i> Manado State Polytenik, Department of Mechanical Engineering</p> <hr/> <p>Material: Hand working equipment and hand power tools Reference: Agung S., 2013. <i>Mechanical technology.</i> Jakarta, Ministry of Education and Culture</p>	3%
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12	Students are able to carry out project work on cutting, drilling, trimming, smoothing, plating and folding metal plates using hand tools and hand power tools	1. students carry out cutting, drilling, trimming, smoothing and folding metal plates using hand tools and hand power tools and make reports 2. Participative	<p>Criteria:</p> <p>1. Accuracy in size, harmony, neatness, smoothness of product results in cutting, drilling, trimming, smoothing, folding metal plates, including student performance in doing work and report quality, max score 50%</p> <p>2. Participative, min score 50%</p> <p>Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment, Practical Assessment, Practical / Performance</p>	Short presentations and discussions; group assignments to search for sources of information, discussions and cutting, drilling, plastering, smoothing, plating and folding metal plates using hand tools and hand power tools, making reports; and reflect. The results of the discussion conclusions are uploaded by each student on Google Drive 2 X 50		<p>Material: Working on metal plates Reference: Team, 2013. <i>Basic electromechanical work.</i> Jakarta, Directorate General for Improving the Quality of Educators and Education Personnel, Ministry of Education and Culture</p> <p>Material: Mechanical technology equipment Reference: Rizqi Ilmal Y., Juniawan P. Sahaan, 2023. <i>Mechanical technology in practicum.</i> Bandung, Widina Bhakti Persada</p> <p>Material: Plate work equipment Reference: Erol F. Sumolang, 2017. <i>Bench, pipe and plate work modules.</i> Manado State Polytenik, Department of Mechanical Engineering</p> <p>Material: Hand working equipment and hand power tools Reference: Agung S., 2013. <i>Mechanical technology.</i> Jakarta, Ministry of Education and Culture</p>	3%
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13	Using hand tools and hand power tools to install the metal plate frame of the panel box, and make reports	1.Using hand tools and hand power tools to install metal plate frame panel boxes, and make written/oral reports 2.Participative	Criteria: 1.Accuracy in using hand tools and hand power tools, product performance, student performance, and report quality, ma'am score. 50% 2.Participative, min score 50% Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Practical Assessment, Practical / Performance	Short presentations and discussions; group assignments to search for sources of information, group discussions and use hand tools and hand power tools to install metal plate frame panel boxes, make reports; and reflect. The report results are uploaded to Google individually on 2 X 50 drives		Material: Mechanical technology equipment Reference: Rizqi Ilmal Y., Juniawan P. Siahaan, 2023. <i>Mechanical technology in practicum.</i> Bandung, Widina Bhakti Persada Material: Assembling a metal plate frame Reference: Team, 2013. <i>Basic electromechanical work.</i> Jakarta, Directorate General for Improving the Quality of Educators and Education Personnel, Ministry of Education and Culture Material: Plate work and hand power tools Reference: Agung S., 2013. <i>Mechanical technology.</i> Jakarta, Directorate General for Improving the Quality of Educators and Education Personnel, Ministry of Education and Culture	3%
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14	Using hand tools and hand power tools to install the metal plate frame of the panel box, and make reports	<p>1.Using hand tools and hand power tools to install metal plate frame panel boxes, and make written/oral reports</p> <p>2.Participative</p>	<p>Criteria:</p> <p>1.Accuracy in using hand tools and hand power tools, product performance, student performance, and report quality, ma'am score. 50%</p> <p>2.Participative, min score 50%</p> <p>Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment, Practical Assessment, Practical / Performance</p>	<p>Short presentations and discussions; group assignments to search for sources of information, group discussions and use hand tools and hand power tools to install metal plate frame panel boxes, make reports; and reflect. The report results are uploaded to Google individually on 2 X 50</p> <p>drives</p>		<p>Material: Mechanical technology equipment</p> <p>Reference: Rizqi Ilmal Y., Juniawan P. Siahaan, 2023. <i>Mechanical technology in practicum.</i> Bandung, Widina Bhakti Persada</p> <hr/> <p>Material: Assembling a metal plate frame</p> <p>Reference: Team, 2013. <i>Basic electromechanical work.</i> Jakarta, Directorate General for Improving the Quality of Educators and Education Personnel, Ministry of Education and Culture</p> <hr/> <p>Material: Plate work and hand power tools</p> <p>Reference: Agung S., 2013. <i>Mechanical technology.</i> Jakarta, Directorate General for Improving the Quality of Educators and Education Personnel, Ministry of Education and Culture</p>	3%
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15	Using hand tools and hand power tools to install control components, electrical components, electronic components on the electrical panel box	1.Using hand tools and hand power tools to install control components, electrical components, electronic components on panel boxes, test product results, and make reports 2.Participative	Criteria: 1.Accuracy of results identifying types of hand tools and hand power tools, functions, parts, how to use, and how to maintain them for installing control components, electrical components, electronic components in panel boxes, how to install and installation techniques, mak score. 50% 2.Participative, min score 50% Forms of Assessment : Participatory Activities, Project Results Assessment / Product Assessment, Portfolio Assessment, Practice / Performance, Tests	Short presentations and discussions; group assignments to explore sources of information and discussion, students use, maintenance methods to be used to install control components, electrical components, electronic components on electrical panel boxes to report the results of work; and reflect. The report results are uploaded to Google individually 2 X 50		Material: Mechanical technology equipment Reference: Rizqi Ilmal Y., Juniawan P. Siahaan, 2023. <i>Mechanical technology in practicum.</i> Bandung, Widina Bhakti Persada Material: Assembling a metal plate frame Reference: Team, 2013. <i>Basic electromechanical work.</i> Jakarta, Directorate General for Improving the Quality of Educators and Education Personnel, Ministry of Education and Culture Material: Plate work and hand power tools Reference: Agung S., 2013. <i>Mechanical technology.</i> Jakarta, Directorate General for Improving the Quality of Educators and Education Personnel, Ministry of Education and Culture Material: Assembly of electronic components on plates Reference: Joko, 2023 <i>Electronic electromechanical equipment.</i> Unesa FT Electrical Engineering Group	5%
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16	UAS: presentation of summary results using PPT whose material starts from the 9th-15th meetings in groups	1.PowerPoinf, making presentations, holding discussions and questions and answers, answering supervisory lecturers' questions, and revising PPT by adding question and answer results complete with photo documents, question and answer results, and answers to lecturers' questions 2.Participative	<p>Criteria:</p> <p>1.PowerPoinf accuracy in substance and beauty, max score 20%; presentation quality, mam score. 5%, quality of discussion and questions and answers, max score. 5%; accuracy of answers to lecturer questions, max score 15; Accuracy and honesty with no result of revision, max score 5%. Answering questions, and revising the PPT by adding the results of the questions and answers complete with photo documents, and answers to questions from the lecturer in the development of the technology and a complete report</p> <p>2.Participation, min score 50%</p> <p>Form of Assessment : Participatory Activities, Tests</p>	Evaluation 3 X 50			30%
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Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	28.45%
2.	Project Results Assessment / Product Assessment	10.95%
3.	Portfolio Assessment	13.95%
4.	Practical Assessment	8.2%
5.	Practice / Performance	13.45%
6.	Test	26%
		100%

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.
- 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.
- 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.
- Indicators for assessing** abilities in the process and student learning outcomes are specific and measurable statements that identify the abilities or performance of student learning outcomes accompanied by evidence.
- 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.
- Forms of assessment:** test and non-test.
- 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.
- 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.
- Learning materials** are details or descriptions of study materials which can be presented in the form of several main points and sub-topics.
- 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%.
- TM=Face to face, PT=Structured assignments, BM=Independent study.

