



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																																																	
Mechanical Technology	8320302186	Study Program Elective Courses	T=2	P=0	ECTS=3.18	1 April 27, 2023																																																	
AUTHORIZATION		SP Developer	Course Cluster Coordinator		Study Program Coordinator																																																		
		Dr. Soeryanto, M.Pd., Ali Hasbi Ramadani, M.Pd; Iskandar S.T., M.T.;	Dr. Soeryanto, M.Pd.		Ir. Wahyu Dwi Kurniawan, S.Pd., M.Pd.																																																		
Learning model	Case Studies																																																						
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																																						
	PLO-6	Able to apply and analyze pedagogical competencies in mechanical engineering education continuously throughout life																																																					
	PLO-10	Have an understanding of mathematics and basic mechanical engineering																																																					
	Program Objectives (PO)																																																						
	PO - 1	Students can explain or understand the basic concepts of the manufacturing process, mechanical properties of materials, changing shape, cutting, joining, changing properties, and surface finishing in the production process																																																					
	PLO-PO Matrix																																																						
		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>P.O</td> <td>PLO-6</td> <td>PLO-10</td> <td></td> <td></td> <td></td> </tr> <tr> <td>PO-1</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>					P.O	PLO-6	PLO-10				PO-1																																										
P.O	PLO-6	PLO-10																																																					
PO-1																																																							
PO Matrix at the end of each learning stage (Sub-PO)																																																							
	<table border="1" style="margin-left: auto; margin-right: 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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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																																							
PO-1																																																							
Short Course Description	Basic concepts of manufacturing processes ranging from manual to machining processes which are used as a reference for the implementation and application of steps in making a product based on technical criteria																																																						
References	Main :																																																						
	1. S.F. Krar, Technology of Machine Tools, 3rd Edition. Daniel B Dallas, Tools and manufacturing Engineering Handbook, 3rd Edition. 2. Amsted B.H., dkk. 1991. Teknologi Mekanik Jilid 1. Jakarta: PT. Gelora Aksara Pratama																																																						
	Supporters:																																																						
	1. 1. Schey. John, A. 2009. Introduction to Manufacturing Processes/Proses Manufaktur. Yogyakarta: Penerbit Andi 2. 2. Schonmetz Alois. Ing. dkk. 1985. Pekerjaan Logam Dengan Perkakas Tangan Dan Mesin Sederhana. Bandung: Penerbit Angkasa 3. 3. Suratman Maman, S.P.d. 2007. Teknik Mengelas. Bandung: Pustaka Grafika 4. 4. Tata Surdia. 2015. teknik pengecoran logam. Bandung: Balai Pustaka																																																						
Supporting lecturer	Ali Hasbi Ramadani, S.Pd., M.Pd. Bima Anggana Widhiarta Putra, 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 basic manufacturing production processes	1. Able to explain the basic concepts of Mechanical Technology 2. Able to classify types of work processes	Criteria: Assessment rubric Form of Assessment : Participatory Activities	1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50	1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50	Material: definition of mechanical technology Library: SF Krar, <i>Technology of Machine Tools, 3rd Edition. Daniel B Dallas, Tools and manufacturing Engineering Handbook, 3rd Edition.</i> Material: basic production Library: Amsted BH, et al. 1991. <i>Mechanical Technology Volume 1. Jakarta: PT. Gelora Aksara Pratama</i> Material: manufacturing process References: 1. Schey, John, A. 2009. <i>Introduction to Manufacturing Processes. Yogyakarta: Publisher Andi</i> Material: type of work References: 2. Schonmetz Alois. Ing, et al. 1985. <i>Metal Work with Hand Tools and Simple Machines. Bandung: Space Publishers</i>	5%
2	Understand basic manufacturing production processes	1. Able to explain the basic concepts of the production process 2. Explain the development of the production process	Criteria: Assessment rubric Form of Assessment : Participatory Activities, Tests	Discussion and Questions and Answers Problem Based Learning / Learning Based on Problems 2 X 50	Discussion and Questions and Answers Problem Based Learning / Learning Based on Problems 2 X 50	Material: production criteria References: SF Krar, <i>Technology of Machine Tools, 3rd Edition. Daniel B Dallas, Tools and manufacturing Engineering Handbook, 3rd Edition.</i> Material: economic production Reference: Amsted BH, et al. 1991. <i>Mechanical Technology Volume 1. Jakarta: PT. Gelora Aksara Pratama</i> Material: efficient production References: 1. Schey, John, A. 2009. <i>Introduction to Manufacturing Processes/Proses Manufaktur. Yogyakarta: Publisher Andi</i>	10%
3	Understand the mechanical properties of materials	1. Able to explain the theory of material strength 2. Able to explain the mechanical properties of materials	Criteria: Assessment rubric Form of Assessment : Participatory Activities, Tests	Lectures, simulations, discussions, problem solving, questions and answers, ICT (Information, Communication, Technology) 2 X 50	Lectures, simulations, discussions, problem solving, questions and answers, ICT (Information, Communication, Technology) 2 X 50	Material: power Library: SF Krar, <i>Technology of Machine Tools, 3rd Edition. Daniel B Dallas, Tools and manufacturing Engineering Handbook, 3rd Edition.</i> Material: elasticity Reference: Amsted BH, et al. 1991. <i>Mechanical Technology Volume 1. Jakarta: PT. Gelora Aksara Pratama</i> Material: hardness References: 1. Schey, John, A. 2009. <i>Introduction to Manufacturing Processes. Yogyakarta: Publisher Andi</i> Material: tenacity References: 2. Schonmetz Alois. Ing, et al. 1985. <i>Metal Work with Hand Tools and Simple Machines. Bandung: Space Publishers</i> Material: fatigue, elasticity, brittleness References: 3. Suratman Maman, SPd 2007. <i>Welding Techniques. Bandung: Graphic Library</i>	5%

4	Understand the mechanical properties of materials	<p>1. Able to explain the theory of material strength</p> <p>2. Able to explain the mechanical properties of materials</p>	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Participatory Activities</p>	Lectures, simulations, discussions, problem solving, questions and answers, ICT (Information, Communication, Technology 2 X 50	Lectures, simulations, discussions, problem solving, questions and answers, ICT (Information, Communication, Technology 2 X 50	<p>Material: power Library: SF Krar, <i>Technology of Machine Tools, 3rd Edition.</i> Daniel B Dallas, <i>Tools and manufacturing Engineering Handbook, 3rd Edition.</i></p> <hr/> <p>Material: elasticity Reference: Amsted BH, et al. 1991. <i>Mechanical Technology Volume 1.</i> Jakarta: PT. Gelora Aksara Pratama</p> <hr/> <p>Material: hardness References: 1. Schey, John, A. 2009. <i>Introduction to Manufacturing Processes.</i> Yogyakarta: Publisher Andi</p> <hr/> <p>Material: tenacity References: 2. Schonmetz Alois. Ing, et al. 1985. <i>Metal Work with Hand Tools and Simple Machines.</i> Bandung: Space Publishers</p> <hr/> <p>Material: fatigue, elasticity, brittleness References: 3. Suratman Maman, SPd 2007. <i>Welding Techniques.</i> Bandung: Graphic Library</p>	5%
5	Understanding Heat Treatment	Able to explain the effect of the heat treatment process on changes in the structure and mechanical properties of materials	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Participatory Activities</p>	1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50	1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50	<p>Material: annealing Library: Amsted BH, et al. 1991. <i>Mechanical Technology Volume 1.</i> Jakarta: PT. Gelora Aksara Pratama</p> <hr/> <p>Material: carburizing Bibliography: SF Krar, <i>Technology of Machine Tools, 3rd Edition.</i> Daniel B Dallas, <i>Tools and manufacturing Engineering Handbook, 3rd Edition.</i></p> <hr/> <p>Material: quencing Bibliography: 1. Schey, John, A. 2009. <i>Introduction to Manufacturing Processes/Proses Manufaktur.</i> Yogyakarta: Publisher Andi</p> <hr/> <p>Material: other heat treatments References: 1. Schey, John, A. 2009. <i>Introduction to Manufacturing Processes.</i> Yogyakarta: Publisher Andi</p>	5%
6	Understand the classification of metal forming processes	<p>1. Able to understand the types of forming processes using hot working</p> <p>2. Able to understand the types of forming using cold working</p>	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Portfolio Assessment</p>	1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50	1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50	<p>Material: hot working Library: Amsted BH, et al. 1991. <i>Mechanical Technology Volume 1.</i> Jakarta: PT. Gelora Aksara Pratama</p> <hr/> <p>Material: cold working Reference: Amsted BH, et al. 1991. <i>Mechanical Technology Volume 1.</i> Jakarta: PT. Gelora Aksara Pratama</p> <hr/> <p>Material: forging, rolling, drawing, etc. Library: SF Krar, <i>Technology of Machine Tools, 3rd Edition.</i> Daniel B Dallas, <i>Tools and manufacturing Engineering Handbook, 3rd Edition.</i></p>	5%
7	Understand the classification of metal forming processes	<p>1. Able to understand the types of forming processes using hot working</p> <p>2. Able to understand the types of forming using cold working</p>	<p>Criteria: Assessment rubric</p> <p>Form of Assessment : Portfolio Assessment</p>	1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50	1. Direct and Cooperative Learning Model 2. Discussion and Questions and Answers 2 X 50	<p>Material: hot working Library: Amsted BH, et al. 1991. <i>Mechanical Technology Volume 1.</i> Jakarta: PT. Gelora Aksara Pratama</p> <hr/> <p>Material: cold working Reference: Amsted BH, et al. 1991. <i>Mechanical Technology Volume 1.</i> Jakarta: PT. Gelora Aksara Pratama</p> <hr/> <p>Material: forging, rolling, drawing, etc. Library: SF Krar, <i>Technology of Machine Tools, 3rd Edition.</i> Daniel B Dallas, <i>Tools and manufacturing Engineering Handbook, 3rd Edition.</i></p>	5%

8	UTS	Compliance with the answer key	Criteria: Assessment rubric Form of Assessment : Participatory Activities	2 X 50 evaluation test	2 X 50 evaluation test	Material: Meeting material 1 to 7 References: SF Krar, <i>Technology of Machine Tools, 3rd Edition.</i> Daniel B Dallas, <i>Tools and manufacturing Engineering Handbook, 3rd Edition.</i>	20%
9	Understanding the Metal Casting Process	Students understand traditional and non-traditional casting	Criteria: 1.able to explain temporary metal casting techniques. 2.able to explain contemporary metal casting techniques Form of Assessment : Portfolio Assessment	Lectures, discussions, questions and answers, exercises and assignments 2 X 50	Lectures, discussions, questions and answers, exercises and assignments 2 X 50	Material: sand casting, cell mold casting, vacuum mold casting, high pressure die casting, form casting etc. Reference: 4. <i>Tata Surdia. 2015. Metal casting techniques. Bandung: Balai Pustaka</i>	5%
10	Able to do mechanical work using a drilling machine	1.Students understand the lathe process 2.Students understand the drilling process 3.Students understand the milling process 4.Students understand the grinding process 5.Students understand the types of iris tools	Criteria: Assessment rubric Form of Assessment : Participatory Activities, Portfolio Assessment	Lectures, discussions, questions and answers, exercises and assignments 2 X 50	Lectures, discussions, questions and answers, exercises and assignments 2 X 50	Material: turning, milling, grinding, sawing, References: 2. <i>Schonmetz Alois. Ing, et al. 1985. Metal Work with Hand Tools and Simple Machines. Bandung: Space Publishers</i>	10%
11	Understand metal working and forming processes in the industrial world	1.Understand the rolling process 2.Understand the drawing process 3.Understand the forging process 4.Understand the extrusion process	Criteria: Assessment rubric Form of Assessment : Participatory Activities, Portfolio Assessment	lectures, discussions, questions and answers, exercises and assignments 2 X 50	lectures, discussions, questions and answers, exercises and assignments 2 X 50	Material: forging, rolling, drawing, extrusion Reader: <i>Amsted BH, et al. 1991. Mechanical Technology Volume 1. Jakarta: PT. Gelora Aksara Pratama</i>	10%
12	Understand the process of joining and cutting metal	Able to explain and understand metal joining and cutting techniques	Criteria: Assessment rubric Form of Assessment : Participatory Activities, Tests	lectures, discussions, questions and answers, exercises and assignments 2 X 50	lectures, discussions, questions and answers, exercises and assignments 2 X 50	Material: welding, rivets, bolts, gluing and brazing Reference: <i>Amsted BH, et al. 1991. Mechanical Technology Volume 1. Jakarta: PT. Gelora Aksara Pratama</i>	10%
13	Understand special machining processes	1.understand the process of Jet sandpaper & water jet 2.understand the ultrasonic Machining process 3.understand the process of electrical discharge machining, 4.understand grinding machine quality issues 5.understand the applications of electrochemical machines,	Criteria: Assessment rubric Form of Assessment : Participatory Activities, Portfolio Assessment	lectures, discussions, questions and answers, exercises and assignments 2 X 50		Materials: Ultrasonic machining, Jet sandpaper, water jet, electrical discharge machining, electrochemical machining, laser beam References: 1. <i>Schey,John,A.2009.Introduction to Manufacturing Processes/Manufaktur Process. Yogyakarta:Publisher Andi</i>	10%
14	Understanding the final machining process	Able to explain the process of obtaining the desired surface finish	Criteria: Assessment rubric Form of Assessment : Participatory Activities, Portfolio Assessment	lectures, discussions, questions and answers, exercises and assignments 2 X 50	lectures, discussions, questions and answers, exercises and assignments 2 X 50	Material: Final machining process Reference: <i>Amsted BH, et al. 1991. Mechanical Technology Volume 1. Jakarta: PT. Gelora Aksara Pratama</i>	10%
15	Able to carry out mechanical work using a saw machine	Able to understand the metal powder production process	Criteria: Assessment rubric Form of Assessment : Participatory Activities, Tests	Problem Based Learning/Learning Based on Problems 2 X 50	Problem Based Learning/Learning Based on Problems 2 X 50	Material: ionization, compacting, sintering Reader: <i>Amsted BH, et al. 1991. Mechanical Technology Volume 1. Jakarta: PT. Gelora Aksara Pratama</i>	5%
16	Summative Exam	Compliance with the answer key	Criteria: Assessment rubric Form of Assessment : Participatory Activities	2 x 50 evaluation tests	2 x 50 evaluation tests	Material: All material Library: <i>SF Krar, Technology of Machine Tools, 3rd Edition. Daniel B Dallas, Tools and manufacturing Engineering Handbook, 3rd Edition.</i>	30%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	100%
2.	Portfolio Assessment	35%
3.	Test	15%
		100%

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.