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

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Manufacturing Process III	2120102079		T=2	P=0	ECTS=3.18	6	July 18, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
	.....	.....	Ir. Priyo Heru Adiwibowo, S.T., M.T.

Learning model	**Case Studies**
Program Learning Outcomes (PLO)	**PLO study program that is charged to the course**
	Program Objectives (PO)
	PLO-PO Matrix

	P.O

PO Matrix at the end of each learning stage (Sub-PO)

P.O	Week															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Short Course Description	Understanding and application of metal forming technology includes mechanics and metallurgy so that we are expected to be able to choose which metal is most appropriate to use in construction.
References	**Main :**

1. Surdia, Tata. 1986. Teknik Pengecoran Logam. Jakarta: Pradnya Paramita.
2. Syam, Suprapti. 1986. Teknologi Pengolahan Bahan. Surabaya: ITS.
3. Siswosuwarno, Mardjono. Teknik Pembentukan Logam. Jurusan Mesin - ITB.
4. Mulyana, Achmad. Teknik Pembentukan. Jurusan Teknik Mesin - ITS.
5. 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. Firman Yasa Utama, S.Pd., M.T.

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	Know about various metal forming processes	**Criteria:** Full marks are obtained if you answer the question correctly	Lectures and questions and answers 2 X 50			0%
2	Understand the working process based on working temperature, based on forming style, based on workpiece shape, based on product stages	Able to determine the difference between hot working and cold working processes	**Criteria:** Full marks are obtained if you do all the questions correctly	Lectures, discussions, exercises 2 X 50			0%
3	Understanding deformation mechanisms, understanding elastic and plastic deformation, micro deformation, slip mechanisms, dislocation theory	Able to determine the difference between hot working and cold working processes		Lectures, discussions, questions and answers, and assignments 2 X 50			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	Able to determine the difference between hot working and cold working processes		Lectures, discussions, questions and answers 2 X 50			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	Able to determine the difference between hot working and cold working processes		Lecture, discussion, question and answer 1 X 1			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	Able to determine the difference between hot working and cold working processes		Lectures, discussions, questions and answers 2 X 50			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	Able to determine the difference between hot working and cold working processes		Lectures, discussions, questions and answers 2 X 50			0%
8	U.S.S			2 X 50			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	Able to determine the difference between hot working and cold working processes		Lectures, discussions, questions and answers 2 X 50			0%
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	Able to determine the difference between hot working and cold working processes		Lectures, discussions, questions and answers 2 X 50			0%
11	Understand the analysis of forming forces, deformation areas and deformation patterns, element theory or slab methods, energy methods	Able to determine the difference between hot working and cold working processes		Lectures, discussions, questions and answers 2 X 50			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	Able to determine the difference between hot working and cold working processes		Lectures, discussions, questions and answers 2 X 50			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	Planning metal forming processes from initial raw materials to finished products		Lectures, discussions, questions and answers 2 X 50			0%

14	Understand the sheet metal forming process, scissor process, bending process, deep drawing, stretching	Planning metal forming processes from initial raw materials to finished products		Discussion, consultation and presentation 2 X 50			0%
15	Understand the process of rolling, forging	Planning metal forming processes from initial raw materials to finished products		Discussion, consultation and presentation 2 X 50			0%
16	US			2 X 50			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.