	Universitas Negeri Surabaya Vocational Faculty, D4 Mechanical Engineering Study Program	Document Code

SEMESTER LEARNING PLAN

Courses		CODE	Course Family	Credit Weight			SEMESTER	Compilation Date
Engineering Design		2130203024	Compulsory Study Program Subjects	T=2	P=0	ECTS=3.18	3	February 6, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
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Learning model	Project Based Learning

Program Learning Outcomes (PLO)	PLO study program which is charged to the course	
	PLO-9	Able to apply knowledge of mathematics, science and/or materials, and engineering to gain a thorough understanding of engineering principles.
	Program Objectives (PO)	
	PO - 1	Mastering the basic concepts of mechanical engineering in general and the basic concepts of machining engineering concentration
	PLO-PO Matrix	

P.O	PLO-9
PO-1	

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
PO-1																

Short Course Description	Understanding various production processes and mechanisms, determining torque requirements, calculating engine rotation, calculating power requirements, selecting drive motors, gear boxes, pulleys, belts, chains as needed, designing transmission systems, designing machine component placement, calculating shaft diameters, determining bearing types and the bolt nuts, create a picture of the engine arrangement.

References	Main :	
	1. Mott, Robert L., 2009. Elemen-Elemen Mesin dalam Perancangan Mekanis Edition 1st. Yogyakarta: ANDI 2. Mott, Robert L., 2009. Elemen-Elemen Mesin dalam Perancangan Mekanis Edition 2nd. Yogyakarta: ANDI 3. Mott, Robert L., 2004. Machine Elements in Mechanical Design Edition 4th. United State of America: Pearson Prentice Hall. 4. Kenneth S.Hurst, Engineering Design Principles, Penerbit Erlangga, Jakarta, 2006. 5. M.F. Spotts,T.E. Shoup, Design of Machine Elements. Seventh Edition, International Edition, 1998. 6. Sularso, 1987. Kiyokatsu Suga, Dasar Perencanaan dan Pemilihan Elemen Mesin, PT. Pradnya Paramita, Jakarta 4. 7. Bahan-bahan dari Internet dan kepustakaan lain	
	Supporters:	
	1. Holowenko, dkk, 1980 , Machine Design , Asian Student Edition, Schaums Outline Series, New York : Mc Graw-Hill Book, Inc. 2. Shigley, J.E., Mitchell, L.D.,1986, Perencanaan Teknik Mesin, Jakarta : Erlangga 3. Umar Sukrisno, 1983, Bagian-bagian Mesin dan Merencana, Jakarta : Erlangga	

	Supporting lecturer	Diah Wulandari, S.T., M.T. Dyah Riandadari, S.T., M.T. Arya Mahendra Sakti, S.T., M.T. Firman Yasa Utama, S.Pd., M.T. Andita Nataria Fitri Ganda, S.T., M.Sc. Ferly Isnomo Abdi, S.T., 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	Able to identify tool/machinery product needs.	1.Able to define design problems 2.Able to explore ideas 3.Creativity	**Criteria:** According to the scoring guidelines and presentation rubric, full marks are obtained if you do all the questions well and correctly **Form of Assessment** : Participatory Activities, Portfolio Assessment	1. Field observations. 2. Case study. 2 X 50	1. Hunting on the internet 2. Case Study 1x50	**Material:** Identifying community needs: Business World, Industrial World, Appropriate Technology **Reference:** *Kenneth S. Hurst, Engineering Design Principles, Erlangga Publisher, Jakarta, 2006.*	10%
2	Determine torque requirements for the production process	Skilled in choosing the amount of torque on production machines		Discussion of questions and answers on 3 X 50 exercises and assignments			0%
3	Calculate engine rotation according to capacity	Determine the rotation on the appropriate machine		Discussion, questions and answers, exercises and assignments 3 X 50			0%
4	Calculate engine power requirements	Determines the power on the machine		Discussion of questions and answers on 3 X 50 exercises and assignments			0%
5	Choose the motor, gearbox, pulley, belt, chain according to your needs	Skilled in selecting machine components according to needs		Discussion, questions and answers, exercises and assignments 3 X 50			0%
6	Designing transmission systems	Skilled in designing transmission systems		Discussion, questions and answers, exercises and assignments 3 X 50			0%
7	Understand material 1 to 6	Mastering material 1 to 6		Written Exam 3 X 50			0%

8	Design the placement of the main components.	Skilled in determining the placement of the main engine components		Discussion, questions and answers, exercises and assignments 3 X 50			0%
9	Calculating torque moment	Determine the torque moment on the component		Discussion, questions and answers, exercises and assignments 3 X 50			0%
10	Calculate the shaft diameter.	Skilled in calculating component shaft diameters		Discussion, questions and answers, exercises and assignments 3 X 50			0%
11	Determine the type of bearing and bolt nuts.	1.Skilled in choosing the type of bearing on the machine 2.Skilled in selecting nuts and bolts on components		Discussion, questions and answers, exercises and assignments 3 X 50			0%
12	Create an array image	Able to create machine layout drawings using software		Discussion, questions and answers, exercises and assignments 3 X 50			0%
13	Create an array image.	Able to make a drawing of the arrangement of a machine	**Criteria:** Compliance with the answer key	Guided practice and assignments 3 X 50			0%
14	Create an array image.	Able to make a drawing of the arrangement of a machine	**Criteria:** Compliance with the answer key	Guided practice and assignments 3 X 50			0%
15	Create an array image.	Able to make a drawing of the arrangement of a machine	**Criteria:** Compliance with the answer key	Guided practice and assignments 3 X 50			0%
16			**Form of Assessment** : Test				30%

Evaluation Percentage Recap: Project Based Learning

No	Evaluation	Percentage
1.	Participatory Activities	5%
2.	Portfolio Assessment	5%
3.	Test	30%
		40%

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.