	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
Kinematics and Dynamics	8320302051	Compulsory Study Program Subjects	T=2	P=0	ECTS=3.18	2	July 17, 2024

AUTHORIZATION	SP Developer	Course Cluster Coordinator	Study Program Coordinator
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Learning model	**Case Studies**	
Program Learning Outcomes (PLO)	**PLO study program which is charged to the course**	
	PLO-5	Have social competence and personality competence in mechanical engineering education
	PLO-6	Able to apply and analyze pedagogical competencies in mechanical engineering education continuously throughout life
	PLO-8	Able to carry out maintenance and repairs in the automotive engineering field (automotive concentration) or able to operate various production equipment and machines in the manufacturing sector (production concentration)
	PLO-10	Have an understanding of mathematics and basic mechanical engineering
	Program Objectives (PO)	
	PO - 1	Students can master and understand kinematics, the basics of vectors, particle kinematics, types of plane motion, Newton's working principle, the principle of momentum in particles, the principle of momentum in rigid objects, degrees of freedom of mechanisms, determining speed and acceleration in mechanical kinematics
	PLO-PO Matrix	

P.O	PLO-5	PLO-6	PLO-8	PLO-10
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 and mastery of kinematics, basics of vectors, kinematics of particles, types of plane motion, Newton's working principle, principle of momentum in particles, principle of momentum in rigid objects, degrees of freedom of mechanisms, determining speed and acceleration in the kinematics of mechanisms
References	**Main :**

1. Martin, George H. 1982. Kinematics dan Dynamics of Mechanics , 2nd Edition. McGraw Hill.
2. Russel C, Hibbeler. 1995. EngineeringMechanics : Dynamics. Prentice Hall.
3. Hirchorn J. 1962. Kinematics and Dynamics of Plane Mechanism . McGraw Hill Book Company.
4. Ferdinand P Beer, E Russel Johnston Jr. 1998. V ector Mechanism for Engineers, Dynamics, 3rd Edition . McGraw Hill.
5. Priyo Heru Adiwibowo. 2013. Kinematika dan Dinamika, Bagian 1 Kinematika . Unesa University Press.

Supporters:

1. semua materi yang mendukung termasuk media yang berbasis digital

Supporting lecturer	Ali Hasbi Ramadani, 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	Students are able to explain their understanding of the problem that will be designed to design the mechanism	Know the problem to be designed	**Criteria:** Compliance with the answer key **Form of Assessment** : Participatory Activities, Tests	Lectures, discussions, questions and answers, exercises and assignments 2 X 50	case studies, discussions, questions and answers, exercises, and assignments 2 X 50	**Material:** mechanisms **Bibliography:** *Martin, George H. 1982. Kinematics and Dynamics of Mechanics, 2nd Edition. McGraw Hill.*	5%
2	Students are able to explain their understanding of the stages in designing a mechanism	Know the stages of design	**Criteria:** Compliance with the answer key **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:** mechanisms **Bibliography:** *Martin, George H. 1982. Kinematics and Dynamics of Mechanics, 2nd Edition. McGraw Hill.*	5%
3	Students are able to use physical quantities, symbols and units	Use physical quantities, symbols and units	**Criteria:** Compliance with the answer key **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:** quantities in kinematics and dynamics **Reference:** *Priyo Heru Adiwibowo. 2013. Kinematics and Dynamics, Part 1 Kinematics. Unesa University Press.*	5%
4	Students are able to use the basics of vectors	Identifying scalar and vector quantities Drawing vectors Skilled in using addition, subtraction and resultant vectors Skilled in using vector decomposition	**Criteria:** Compliance with the answer key **Form of Assessment** : Participatory Activities	Lectures, discussions, questions and answers, exercises and assignments 2 X 50	Lectures, discussions, questions and answers, exercises and assignments 2 X 50	**Material:** vector **Bibliography:** *Ferdinand P Beer, E Russel Johnston Jr. 1998. Vector Mechanism for Engineers, Dynamics, 3rd Edition . McGraw Hill.*	5%
5	Students are able to use the basics of vectors	Skilled in using vectors in the Cartesian axis system Skilled in using multiplication of vectors with scalars Skilled in using multiplication of vectors with vectors	**Criteria:** Compliance with the answer key **Form of Assessment** : Participatory Activities, Tests	case studies, exercises and assignments 2 X 50	case studies, exercises and assignments 2 X 50	**Material:** vector **Bibliography:** *Ferdinand P Beer, E Russel Johnston Jr. 1998. Vector Mechanism for Engineers, Dynamics, 3rd Edition . McGraw Hill.*	5%

6	Students are able to use particle motion on a flat plane	Distinguish between absolute and relative vectors Skilled in using Cartesian coordinates Skilled in using polar coordinates Skilled in using motion reference axis systems Skilled in using absolute and relative particle motion	**Criteria:** Compliance with the answer key **Form of Assessment** : Participatory Activities	case studies, exercises, and 2 X 50 assignments	case studies, exercises, and 2 X 50 assignments	**Material:** particle motion **Reference:** *Priyo Heru Adiwibowo. 2013. Kinematics and Dynamics, Part 1 Kinematics. Unesa University Press.*	5%
7	Students are able to use particle motion on a flat plane	Distinguish between absolute and relative vectors Skilled in using Cartesian coordinates Skilled in using polar coordinates Skilled in using motion reference axis systems Skilled in using absolute and relative particle motion	**Criteria:** Compliance with the answer key **Forms of Assessment** : Participatory Activities, Portfolio Assessment, Tests	case studies, exercises, and 2 X 50 assignments	case studies, exercises, and 2 X 50 assignments	**Material:** particle motion **Reference:** *Priyo Heru Adiwibowo. 2013. Kinematics and Dynamics, Part 1 Kinematics. Unesa University Press.*	5%
8	UTS	Accuracy with answer key	**Criteria:** Assessment rubric **Form of Assessment** : Participatory Activities	evaluation 2 X 50		**Material:** Material 1-7 **Bibliography:** *Martin, George H. 1982. Kinematics and Dynamics of Mechanics, 2nd Edition. McGraw Hill.*	10%
9	Students are able to use the images of speed and acceleration	1. Skilled at using Shadows of speed and acceleration 2. Skilled at completing Speed & Acceleration	**Criteria:** Assessment rubric **Form of Assessment** : Participatory Activities, Tests	case studies, discussions, exercises and assignments 2 X 50	case studies, discussions, exercises and assignments 2 X 50	**Material:** calculating speed and acceleration **References:** *Martin, George H. 1982. Kinematics and Dynamics of Mechanics, 2nd Edition. McGraw Hill.*	5%
10	Students are able to use the poles of speed and acceleration	1. Skilled at using Shadows of speed and acceleration 2. Skilled at completing Speed & Acceleration	**Criteria:** Assessment rubric **Form of Assessment** : Participatory Activities, Tests	case studies, discussions, exercises and assignments 2 X 50	case studies, discussions, exercises and assignments 2 X 50	**Material:** calculating speed and acceleration **References:** *Martin, George H. 1982. Kinematics and Dynamics of Mechanics, 2nd Edition. McGraw Hill.*	5%
11	Students are able to use the poles of speed and acceleration	1. Skilled at using Shadows of speed and acceleration 2. Skilled at completing Speed & Acceleration	**Criteria:** according to theory and answer key **Form of Assessment** : Participatory Activities, Tests	case studies, discussions, exercises and assignments 2 X 50	case studies, discussions, exercises and assignments 2 X 50	**Material:** calculating speed and acceleration **References:** *Martin, George H. 1982. Kinematics and Dynamics of Mechanics, 2nd Edition. McGraw Hill.*	5%

12	Students are able to use the poles of speed and acceleration	1.• Using Relative Motion of Two Planes and Relative Velocity Poles 2.• Using Speed Poles on Mechanisms.	**Criteria:** according to theory and answer key **Form of Assessment** : Participatory Activities, Tests	case studies, discussions, exercises and assignments 2 X 50	case studies, discussions, exercises and assignments 2 X 50	**Material:** calculating speed and acceleration **References:** *Martin, George H. 1982. Kinematics and Dynamics of Mechanics, 2nd Edition. McGraw Hill.*	5%
13	Students are able to analyze the speed of mechanisms in various ways	1.• Analyze the speed of the mechanism using the Speed Pole 2.• Analyzing Mechanism Speed by means of Orthogonal Speed 3.• Analyzing Speed With Relative Speed	**Criteria:** according to theory and answer key **Form of Assessment** : Participatory Activities, Tests	case studies, discussions, exercises and assignments 2 X 50	case studies, discussions, exercises and assignments 2 X 50	**Material:** calculating speed and acceleration **References:** *Martin, George H. 1982. Kinematics and Dynamics of Mechanics, 2nd Edition. McGraw Hill.*	5%
14	Students are able to analyze the speed of mechanisms in various ways	1.• Analyze the speed of the mechanism using the Speed Pole 2.• Analyzing Mechanism Speed by means of Orthogonal Speed 3.• Analyzing Speed With Relative Speed	**Criteria:** according to theory and answer key **Form of Assessment** : Participatory Activities, Tests	case studies, discussions, exercises and assignments 2 X 50	case studies, discussions, exercises and assignments 2 X 50	**Material:** calculating speed and acceleration **References:** *Martin, George H. 1982. Kinematics and Dynamics of Mechanics, 2nd Edition. McGraw Hill.*	5%
15	Students are able to analyze the speed of mechanisms in various ways	1.• • Analyzing Acceleration Using Relative Acceleration 2.• • Explain the Corriolis Component of Normal Acceleration 3.• • Explain the Guidelines for determining the direction of the Corriolis Acceleration Component	**Criteria:** according to theory and answer key **Form of Assessment** : Participatory Activities, Tests	case studies, discussions, exercises and assignments 2 X 50	case studies, discussions, exercises and assignments 2 X 50	**Material:** calculating speed and acceleration **References:** *Martin, George H. 1982. Kinematics and Dynamics of Mechanics, 2nd Edition. McGraw Hill.*	5%
16	UAS	Compliance with the answer key	**Criteria:** Assessment rubric **Form of Assessment** : Participatory Activities	Evaluation 2 x 50	Evaluation 2 x 50	**Material:** Material 8-15 **Bibliography:** *Martin, George H. 1982. Kinematics and Dynamics of Mechanics, 2nd Edition. McGraw Hill.*	20%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	69.17%
2.	Portfolio Assessment	1.67%

3.	Test	29.17%
		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** 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.
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.