



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

Document Code

SEMESTER LEARNING PLAN

Courses	CODE	Course Family	Credit Weight			SEMESTER	Compilation Date																																																	
Applied physics	xx21401020282	Compulsory Study Program Subjects	T=3	P=0	ECTS=4.77	1	July 17, 2024																																																	
AUTHORIZATION	SP Developer		Course Cluster Coordinator			Study Program Coordinator																																																		
		Diah Wulandari, S.T., M.T.			Arya Mahendra Sakti, S.T., M.T.																																																		
Learning model	Case Studies																																																							
Program Learning Outcomes (PLO)	PLO study program that is charged to the course																																																							
	PLO-8	Designing components, systems and/or mechanical processes to meet expected needs with an analytical approach to engineering based on the latest manufacturing science and technology and considering technical standards, performance aspects, reliability and ease of application, and/or utilizing the potential of local and national resources with insight global.																																																						
	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	Students are able to understand the concepts of motion, work, energy, vibration and heat.																																																						
	PLO-PO Matrix																																																							
		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>P.O</td> <td>PLO-8</td> <td>PLO-9</td> <td colspan="4"></td> </tr> <tr> <td>PO-1</td> <td></td> <td></td> <td colspan="4"></td> </tr> </table>						P.O	PLO-8	PLO-9					PO-1																																									
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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	Study of basic physics concepts and their application in mechanical engineering, including quantities, unit systems, kinematics, dynamics, elasticity, temperature and heat.																																																							
References	Main :																																																							
	<ol style="list-style-type: none"> 1. Diah Wulandari. 2014. Fisika Teknik I . Swadana. 2. Frederickj, Bueche. 2006. Schaums Outline of theory and problems of College Physics . edisi Kesepuluh Erlangga. 3. Halliday, Resnick dan Jearl Walker. 2011. Principles Of Physics . Ninth Edition John Wiley & Son. 4. Sears Zemansky. 1986. Fisika untuk Universitas 1 . Binacipta. 																																																							
	Supporters:																																																							
Supporting lecturer	Diah Wulandari, S.T., M.T. Dyah Riandadari, S.T., 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	Students are able to communicate their understanding of quantities in physics	<ol style="list-style-type: none"> 1.Students can: Determine quantities in physics 2.Explain the symbols and units of physical quantities 3.Convey ideas/questions 	Criteria: Completeness of the quantity analysis results report.	Discussion lectures and questions and answers 3 X 50		Material: Symbols and units of quantities. Reference: <i>Frederickj, Bueche. 2006. Schaums Outline of theory and problems of College Physics. Tenth edition of Erlangga.</i>	0%
2	Students are able to communicate their understanding of vectors	<ol style="list-style-type: none"> 1.Students can: Calculate the addition and subtraction of vectors 2.Determine the resultant force by vector decomposition 	Criteria: Completeness of the vector analysis results report	Discussion lectures and questions and answers 3 X 50		Material: Addition and subtraction of vectors Reader: <i>Diah Wulandari. 2014. Engineering Physics I. Self-funding.</i>	0%
3	Students are able to communicate their understanding of particle equilibrium	<ol style="list-style-type: none"> 1.Students can: Explain the conditions for balance 2.Determines the decomposition of forces on particles 3.Convey ideas/questions 	Criteria: Completeness of the report on the results of the particle balance analysis.	Discussion lectures and questions and answers 3 X 50		Material: Newton's First and Third Laws are conditions for equilibrium. Reader: <i>Sears Zemansky. 1986. Physics for Universities 1 . Binakreatif.</i>	0%
4	Students are able to communicate their understanding of force moment equilibrium	<ol style="list-style-type: none"> 1.Students can: Calculate the moment of force 2.Calculating the resultant parallel force 3.Convey ideas/questions 	Criteria: Completeness of the report on the results of the force moment equilibrium analysis.	Discussion lectures and questions and answers 3 X 50		Material: Moment of force and resultant parallel force References: <i>Halliday, Resnick and Jearl Walker. 2011. Principles Of Physics. Ninth Edition John Wiley & Son.</i>	0%
5	Students are able to communicate their understanding of force moment equilibrium	<ol style="list-style-type: none"> 1.Students can: Calculate the center of gravity 2.Explain coupling styles 3.Convey ideas/questions 	Criteria: Completeness of the report on the results of the analysis of the coupling force and center of gravity.	Discussion lectures and questions and answers 3 X 50		Material: Coupling force and Center of gravity References: <i>Halliday, Resnick and Jearl Walker. 2011. Principles Of Physics. Ninth Edition John Wiley & Son.</i>	0%
6	Students are able to communicate their understanding of movement	<ol style="list-style-type: none"> 1.Students can: Determine types of motion in physics 2.Explains average & instantaneous speed & acceleration 3.Convey ideas/questions 	Criteria: Completeness of the report on the results of the analysis of average and instantaneous speed and acceleration	Discussion lectures and questions and answers 3 X 50		Material: Average and instantaneous speed and acceleration Reader: <i>Diah Wulandari. 2014. Engineering Physics I. Self-funding.</i>	0%

7	Students are able to communicate their understanding of movement	<ol style="list-style-type: none"> 1. Students can: Calculate the speed & acceleration of moving objects 2. Determine the components of speed 	Criteria: Completeness of the report on the results of the analysis of straight motion and free falling objects	Discussion lectures and questions and answers 3 X 50		Material: Rectilinear motion and free falling objects References: <i>Frederickj, Bueche. 2006. Schaums Outline of theory and problems of College Physics. Tenth edition of Erlangga.</i>	0%
8	Midterm Exam (UTS)	Able to understand the concept of quantities in physics, vectors, particle balance, force moment balance, and motion	Criteria: Full marks are obtained if you do all the questions correctly Form of Assessment : Test	3 X 50			15%
9	Students are able to communicate their understanding of case method learning for applying physics to appropriate technology in the form of a journal resume	<ol style="list-style-type: none"> 1. Students can resume the Appropriate Technology journal 2. Students can present their resume results 	Criteria: Presentations and discussions Form of Assessment : Participatory Activities	Lectures, discussions and questions and answers 3 X 50			25%
10	Students are able to communicate their understanding of case method learning for applying physics to appropriate technology in the form of a journal resume	<ol style="list-style-type: none"> 1. Students can resume the Appropriate Technology journal 2. Students can present their resume results 	Criteria: Presentations and discussions Form of Assessment : Participatory Activities	Lectures, discussions and questions and answers 3 X 50			25%

11	Students are able to communicate their understanding of parabolic motion and circular motion	<ol style="list-style-type: none"> 1. Students can: Understand the meaning of combining motion and equations in a plane with images. 2. Compare the relationship between the resultant speed of motion and each speed component. 3. Calculate the maximum height and intersection point of the parabola with the X-axis. 4. understand the concept of circular motion with pictures. 5. Formulate uniform circular motion quantitatively with case examples. 6. Explain the meaning of centripetal acceleration with example images. 7. Distinguish between the use of circular motion equations for wheels that are on the same axis or not. 	Criteria: Full marks are obtained if you do all the questions correctly	Lectures, discussions and questions and answers 3 X 50			0%
12	Students are able to communicate their understanding of work and energy	<ol style="list-style-type: none"> 1. Students can: Define mass and weight 2. Describe Newton's second law regarding mass 3. Describe work and energy 4. Explain kinetic energy and potential energy 	Criteria: Full marks are obtained if you do all the questions correctly	Lectures, discussions and questions and answers 3 X 50		Material: Newton's second law, kinetic energy and potential energy. Reader: <i>Sears Zemansky. 1986. Physics for Universities 1 . Binakreatif.</i>	0%
13	Students are able to communicate their understanding of impulse and momentum	<ol style="list-style-type: none"> 1. Students can: Describe momentum 2. Describe impulses 3. Determine the components of the collision 4. Calculate the energy at impact 5. Convey ideas/questions 	Criteria: Full marks are obtained if you do all the questions correctly	Lectures, discussions and questions and answers 3 X 50		Material: Elastic collisions and inelastic collisions Reference: <i>Diah Wulandari. 2014. Engineering Physics I. Self-funding.</i>	0%

14	Students are able to communicate their understanding of elasticity and vibration	1.Students can: Understand the concept of elasticity 2.Explain the concept of vibration	Criteria: Full marks are obtained if you do all the questions correctly	Lectures, discussions and questions and answers 3 X 50		Material: Elasticity and vibration Reference: <i>Frederickj, Bueche. 2006. Schaums Outline of theory and problems of College Physics. Tenth edition of Erlangga.</i>	0%
15	Students are able to communicate their understanding of temperature and expansion	1.Students can: Differentiate the meanings of temperature and heat with case examples. 2.Understand expansion in solids, liquids and gases with examples. 3.Understand that heat given to a substance can increase the temperature and/or change the state of the substance using case examples. 4.Using the law of conservation of energy (Black's principle) to solve simple problems. 5.Distinguish between heat transfer by conduction, convection and radiation with case examples.	Criteria: Full marks are obtained if you do all the questions correctly Form of Assessment : Project Results Assessment / Product Assessment	Lectures, discussions and questions and answers 3 X 50		Material: Temperature and expansion References: <i>Frederickj, Bueche. 2006. Schaums Outline of theory and problems of College Physics. Tenth edition of Erlangga.</i>	15%
16	Final Semester Examination (UAS)		Form of Assessment : Test	3 X 50			20%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	50%
2.	Project Results Assessment / Product Assessment	15%
3.	Test	35%
		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** 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.
- 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.

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.