



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

Document Code

**SEMESTER LEARNING PLAN**

<b>Courses</b>	<b>CODE</b>	<b>Course Family</b>	<b>Credit Weight</b>			<b>SEMESTER</b>	<b>Compilation Date</b>																																
Internal Combustion Motor	2120102057		T=2	P=0	ECTS=3.18	5	July 18, 2024																																
<b>AUTHORIZATION</b>	<b>SP Developer</b>		<b>Course Cluster Coordinator</b>			<b>Study Program Coordinator</b>																																	
	.....		.....			Ir. Priyo Heru Adiwibowo, S.T., M.T.																																	
<b>Learning model</b>	Case Studies																																						
<b>Program Learning Outcomes (PLO)</b>	PLO study program that is charged to the course																																						
	Program Objectives (PO)																																						
	PLO-PO Matrix																																						
		P.O																																					
<b>Short Course Description</b>	Understanding the components, classification and basic cycles of internal combustion engines. Internal combustion engine operating characteristics such as work, average pressure, torque and power, dynamometer, air to fuel ratio, specific fuel consumption, as well as thermal and volumetric efficiency.																																						
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td rowspan="2" style="width: 5%;">P.O</td> <td colspan="16" style="text-align: center;">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> </table>							P.O	Week																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
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<b>References</b>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"><b>Main :</b></td> <td colspan="6"></td> </tr> <tr> <td>1.</td> <td colspan="6">Williard W. Pulkrabek, <i>Engineering Fundamentals of The Internal Combustion Engine</i>, Prentice Hall Bahan-bahan dari Internet dan kepustakaan lain</td> </tr> <tr> <td><b>Supporters:</b></td> <td colspan="6"></td> </tr> </table>							<b>Main :</b>							1.	Williard W. Pulkrabek, <i>Engineering Fundamentals of The Internal Combustion Engine</i> , Prentice Hall Bahan-bahan dari Internet dan kepustakaan lain						<b>Supporters:</b>																	
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<b>Supporting lecturer</b>	Prof. Dr. Muhaji, S.T., M.T.																																						
<b>Week-</b>	<b>Final abilities of each learning stage (Sub-PO)</b>	<b>Evaluation</b>		<b>Help Learning, Learning methods, Student Assignments, [ Estimated time ]</b>		<b>Learning materials [ References ]</b>	<b>Assessment Weight (%)</b>																																
		<b>Indicator</b>	<b>Criteria &amp; Form</b>	<b>Offline ( offline )</b>	<b>Online ( online )</b>																																		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)																																

1	Students can analyze the types of combustion engines	Students explain the types of combustion engines, based on the location of the combustion chamber, the fuel used, its utilization, the steps for each cycle	<b>Criteria:</b> 1.If the student can answer each question correctly, the score = 100, 2.If the answer is less than perfect = 70	Combination, Lecture, Brainstorming, Discussion, Scientific 2 X 50			0%
2	Students can describe the components of an otto cycle and diesel cycle motor	Students explain the differences between the otto cycle and the diesel cycle	<b>Criteria:</b> 1.If students can answer questions with a score of = 100, 2.If the answer is less than perfect = 70	Combination, Lecture, Brainstorming, Discussion, Scientific 2 X 50			0%
3	Students can describe 2-stroke and 4-stroke motorbikes	Students can explain the differences between 2 and 4 stroke motor cycles, the differences between 2 and 4 strokes	<b>Criteria:</b> 1.If students can answer questions with a score of = 100, 2.If the answer is less than perfect = 70	Combination, Lecture, Brainstorming, Discussion, Scientific 2 X 50			0%
4	Students can describe the fuel system of a gasoline motorbike	Students explain how conventional fuel system components work, and EFI (electronic fuel injection)	<b>Criteria:</b> 1.If students can answer one of the questions correctly = 100, 2.If students give less than perfect answers = 70	Combination, Lecture, Brainstorming, Discussion, Scientific 1 X 1			0%
5	Students can describe the diesel motor fuel system	Students explain how the components of conventional fuel systems and common rail work	<b>Criteria:</b> 1.If students can answer one of the questions correctly = 100, 2.If students give less than perfect answers = 70	Combination, Lecture, Brainstorming, Discussion, Scientific 2 X 50			0%
6	Students can describe the valve mechanism	Students explain the differences, advantages, disadvantages of 4-stroke valve mechanisms, the latest valve mechanism technology from each manufacturer	<b>Criteria:</b> 1.Presentation materials, 2.presentation skills, 3.Teamwork, 4.Responsibility	Combination, Lecture, Brainstorming, Discussion, Scientific 2 X 50			0%
7	Students can describe the ignition system of a gasoline motorbike	Students explain how conventional ignition systems and electronic ignition systems work	<b>Criteria:</b> 1.If students can answer one of the questions correctly = 100, 2.If students give less than perfect answers = 70	Combination, Lecture, Brainstorming, Discussion, Scientific 2 X 50			0%
8							0%
9	Students can analyze cooling systems	Students can explain the function and workings of the cooling system, the types of cooling on petrol motorbikes	<b>Criteria:</b> 1.If students can answer one of the questions correctly = 100, 2.If students give less than perfect answers = 70	Combination, Lecture, Brainstorming, Discussion, Scientific 2 X 50			0%

10	Students can analyze lubricant systems	Students can explain the function of the lubricant system, and identify lubricant codes and various types of lubricants	<b>Criteria:</b> 1.Presentation materials, 2.presentation skills, 3.Teamwork, 4.Responsibility	Combination, Lecture, Brainstorming, Discussion, Scientific 2 X 50			0%
11	Students can analyze exhaust gases	Students can explain the various types of exhaust gases. Students explain how emission control technology works on petrol motorbikes and diesel motorbikes	<b>Criteria:</b> 1.Presentation materials, 2.presentation skills, 3.Teamwork, 4.Responsibility	Combination, Lecture, Brainstorming, Discussion, Scientific 2 X 50			0%
12	Students can blueprint the engine	Students can perform blueprints for cylinder head components, cylinder components, measure cylinder volume	<b>Criteria:</b> 1.If students can measure correctly one of the questions = 100, 2.If students take less than perfect measurements = 70	Structured practice 2 X 50			0%
13	Students can blueprint the engine	Students can perform blueprints for cylinder head components, cylinder components, measure cylinder volume	<b>Criteria:</b> 1.Presentation materials, 2.presentation skills, 3.Teamwork, 4.Responsibility	1 X 1 structured practice			0%
14	Students can do a blue print	Students can calculate cam duration	<b>Criteria:</b> If students prepare reports according to the format = 100	Structured practice 2 X 50			0%
15	Students can carry out critical studies of diesel motor fuel systems	Students test injectors, bosh pumps, and when fuel is sprayed into the combustion chamber	<b>Criteria:</b> If students prepare reports according to the format = 100	Structured practice 2 X 50			0%
16							0%

**Evaluation Percentage Recap: Case Study**

No	Evaluation	Percentage
		0%

**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.

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.