

Short Course Description	The Practical Course on Basic Machine Phenomena is a theoretical and practical mastery of the twisting of rods, columns, bending moments and transverse forces, rod deflection, torque, power, fuel consumption, exhaust emissions, noise levels; Dynamometer, fuel flow meter apparatus; Exhaust gas analyzer, smoke opacimeter; Sound level meter; Simple vibration apparatus, dynamic balancing apparatus, critical revolution; Comparative flow measurement apparatus, fluid circuit friction apparatus; Reynolds number experiment, thermal conductivity.						
References	Main :						
		<ol style="list-style-type: none"> 1. Warju. 2009.PengujianPerforma Mesin Kendaraan Bermotor. Surabaya: Unesa University Press.Warju. 2010.TeknologiReduksi Emisi Gas Buang Kendaraan Bermotor. Surabaya: Unesa UniversityPress.Fox, Robert W. 2011.Introduction to Fluid Mechanics,8th edition. New York:John Wiley & Sons, Inc.P.Inclopera, Frank & Dewitt P. David. 2002.Fundamentals of Heat and MassTransfer, Fifth edition. New York: John Willey and Sons, Inc.Bahan-bahan dari Internet dan kepustakaan lain 2. Warju. 2010.TeknologiReduksi Emisi Gas Buang Kendaraan Bermotor. Surabaya: Unesa UniversityPress. 3. Fox, Robert W. 2011.Introduction to Fluid Mechanics,8th edition. New York:John Wiley & Sons, Inc. 4. P.Inclopera, Frank & Dewitt P. David. 2002.Fundamentals of Heat and MassTransfer, Fifth edition. New York: John Willey and Sons, Inc. 					
	Supporters:						
Supporting lecturer	Indra Herlamba Siregar, S.T., M.T. Ir. Priyo Heru Adiwibowo, S.T., M.T. Dr. Warju, S.Pd., S.T., M.T. Diastian Vinaya Wijanarko, S.T., M.T. Ika Nurjannah, S.Pd., M.T. Handini Novita Sari, 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	Can measure the torque and power of a motor vehicle	<ol style="list-style-type: none"> 1.Can measure the torque of a motor vehicle 2.Can measure the power of a motorized vehicle 	<p>Criteria: According to the scoring guidelines and presentation rubric, full marks are obtained if you follow and do all the practicum well and correctly</p> <p>Form of Assessment : Participatory Activities</p>	Practical 2 X 50		<p>Material: measuring the torque and power of a motor vehicle</p> <p>Reference: Warju. 2009. Motor Vehicle Engine Performance Testing. Surabaya: Unesa University Press. Warju. 2010. Technology for Reducing Motor Vehicle Exhaust Gas Emissions. Surabaya: Unesa UniversityPress. Fox, Robert W. 2011. Introduction to Fluid Mechanics, 8th edition. New York:John Wiley & Sons, Inc. P. Inclopera, Frank & Dewitt P. David. 2002.Fundamentals of Heat and Mass Transfer, Fifth edition. New York: John Willey and Sons, Inc. Materials from the Internet and other literature</p>	5%

2	Can measure the torque and power of a motor vehicle	Able to use a chassis dynamometer to measure torque and power of motorized vehicles	<p>Criteria: According to the scoring guidelines and presentation rubric, full marks are obtained if you follow and do all the practicum well and correctly</p> <p>Form of Assessment : Participatory Activities, Practice/Performance</p>	Practical 2 X 50		<p>Material: using a chassis dynamometer to measure torque and power of motorized vehicles. Reference: Warju. 2009. <i>Motor Vehicle Engine Performance Testing</i>. Surabaya: Unesa University Press. Warju. 2010. <i>Technology for Reducing Motor Vehicle Exhaust Gas Emissions</i>. Surabaya: Unesa University Press. Fox, Robert W. 2011. <i>Introduction to Fluid Mechanics, 8th edition</i>. New York: John Wiley & Sons, Inc. P. Inclopera, Frank & Dewitt P. David. 2002. <i>Fundamentals of Heat and Mass Transfer, Fifth edition</i>. New York: John Willey and Sons, Inc. <i>Materials from the Internet and other literature</i></p>	5%
3	Calculate fuel consumption	Able to calculate fuel consumption	<p>Criteria: According to the scoring guidelines and presentation rubric, full marks are obtained if you follow and do all the practicum well and correctly</p> <p>Form of Assessment : Participatory Activities, Practice/Performance</p>	Practical 2 X 50		<p>Material: calculating fuel consumption Reference: Warju. 2009. <i>Motor Vehicle Engine Performance Testing</i>. Surabaya: Unesa University Press. Warju. 2010. <i>Technology for Reducing Motor Vehicle Exhaust Gas Emissions</i>. Surabaya: Unesa University Press. Fox, Robert W. 2011. <i>Introduction to Fluid Mechanics, 8th edition</i>. New York: John Wiley & Sons, Inc. P. Inclopera, Frank & Dewitt P. David. 2002. <i>Fundamentals of Heat and Mass Transfer, Fifth edition</i>. New York: John Willey and Sons, Inc. <i>Materials from the Internet and other literature</i></p>	5%

4	Can test fuel consumption	Able to test fuel consumption using a measuring cup and stopwatch	<p>Criteria: According to the scoring guidelines and presentation rubric, full marks are obtained if you follow and do all the practicums well and correctly</p> <p>Form of Assessment : Participatory Activities, Practice/Performance</p>	Practical 2 X 50		<p>Material: Testing fuel consumption Reference: Warju. 2009. <i>Motor Vehicle Engine Performance Testing</i>. Surabaya: Unesa University Press. Warju. 2010. <i>Technology for Reducing Motor Vehicle Exhaust Gas Emissions</i>. Surabaya: Unesa University Press. Fox, Robert W. 2011. <i>Introduction to Fluid Mechanics, 8th edition</i>. New York: John Wiley & Sons, Inc. P. Inclopera, Frank & Dewitt P. David. 2002. <i>Fundamentals of Heat and Mass Transfer, Fifth edition</i>. New York: John Willey and Sons, Inc. <i>Materials from the Internet and other literature</i></p>	5%
5	Can measure motor vehicle emissions	Can measure motor vehicle emissions using a gas analyzer	<p>Criteria: According to the scoring guidelines and presentation rubric, full marks are obtained if you follow and do all the practicums well and correctly</p> <p>Form of Assessment : Participatory Activities, Practice/Performance</p>	Practical 2 X 50		<p>Material: motor vehicle emissions Reference: Warju. 2010. <i>Technology for Reducing Motor Vehicle Exhaust Gas Emissions</i>. Surabaya: Unesa University Press.</p>	5%
6	Analyzing motor vehicle emissions	Able to analyze motor vehicle emissions	<p>Criteria: According to the scoring guidelines and presentation rubric, full marks are obtained if you follow and do all the practicums well and correctly</p> <p>Form of Assessment : Participatory Activities, Practice/Performance</p>	Practical 2 X 50		<p>Material: Analyzing motor vehicle emissions Reference: Warju. 2010. <i>Technology for Reducing Motor Vehicle Exhaust Gas Emissions</i>. Surabaya: Unesa University Press.</p>	5%
7	Can measure vehicle noise	Able to measure vehicle noise with a sound level meter	<p>Criteria: According to the scoring guidelines and presentation rubric, full marks are obtained if you follow and do all the practicums well and correctly</p> <p>Form of Assessment : Participatory Activities, Practice/Performance</p>	Practical 2 X 50		<p>Material: Analyzing motor vehicle emissions Reference: Warju. 2010. <i>Technology for Reducing Motor Vehicle Exhaust Gas Emissions</i>. Surabaya: Unesa University Press.</p> <p>Material: Able to measure vehicle noise Reference: Warju. 2010. <i>Technology for Reducing Motor Vehicle Exhaust Gas Emissions</i>. Surabaya: Unesa University Press.</p>	5%

8	Able to analyze vehicle noise	Able to analyze vehicle noise	<p>Criteria: According to the scoring guidelines and presentation rubric, full marks are obtained if you follow and do all the practicums well and correctly</p> <p>Form of Assessment : Participatory Activities, Practice/Performance</p>	Practical 2 X 50		<p>Material: Analyzing motor vehicle emissions Reference: Warju. 2010. <i>Technology for Reducing Motor Vehicle Exhaust Gas Emissions</i>. Surabaya: Unesa University Press.</p> <p>Material: Analyzing vehicle noise Reference: Warju. 2010. <i>Technology for Reducing Motor Vehicle Exhaust Gas Emissions</i>. Surabaya: Unesa University Press.</p>	10%
9	Measuring and Calculating Turbine Input Capacity	<ol style="list-style-type: none"> 1.Measuring Turbine Input Capacity parameters with a v notch weir (Water) or velocymeter (Wind) 2.Calculating Turbine Input Capacity 	<p>Criteria: According to the scoring guidelines and presentation rubric, full marks are obtained if you follow and do all the practicums well and correctly</p> <p>Form of Assessment : Participatory Activities</p>	Practical 2 X 50		<p>Material: Turbine Input Capacity References: Fox, Robert W. 2011. <i>Introduction to Fluid Mechanics, 8th edition</i>. New York: John Wiley & Sons, Inc.</p>	5%
10	Calculating Input Power	Able to calculate Input Power	<p>Criteria: According to the scoring guidelines and presentation rubric, full marks are obtained if you follow and do all the practicums well and correctly</p> <p>Form of Assessment : Participatory Activities</p>	Practical 2 X 50		<p>Material: Turbine Input Capacity References: Fox, Robert W. 2011. <i>Introduction to Fluid Mechanics, 8th edition</i>. New York: John Wiley & Sons, Inc.</p> <p>Material: Input Power References: Fox, Robert W. 2011. <i>Introduction to Fluid Mechanics, 8th edition</i>. New York: John Wiley & Sons, Inc.</p>	5%
11	Measuring and calculating Turbine Torque	<ol style="list-style-type: none"> 1.Measuring Turbine Torque using a prony break 2.Calculating Turbine Torque 	<p>Criteria: According to the scoring guidelines and presentation rubric, full marks are obtained if you follow and do all the practicums well and correctly</p> <p>Form of Assessment : Participatory Activities, Practice/Performance</p>	Practical 2 X 50		<p>Material: Turbine Input Capacity References: Fox, Robert W. 2011. <i>Introduction to Fluid Mechanics, 8th edition</i>. New York: John Wiley & Sons, Inc.</p> <p>Material: Input Power References: Fox, Robert W. 2011. <i>Introduction to Fluid Mechanics, 8th edition</i>. New York: John Wiley & Sons, Inc.</p> <p>Material: Turbine Torque Reference: Fox, Robert W. 2011. <i>Introduction to Fluid Mechanics, 8th edition</i>. New York: John Wiley & Sons, Inc.</p>	5%

12	Measuring and calculating Turbine Power	1.Measure revolutions using a tachometer 2.Calculating Turbine Power from Torque and Turbine rotation results	Criteria: According to the scoring guidelines and presentation rubric, full marks are obtained if you follow and do all the practicums well and correctly Form of Assessment : Practice / Performance	Practical 2 X 50		Material: Turbine Power References: Fox, Robert W. 2011.Introduction to Fluid Mechanics, 8th edition. New York: John Wiley & Sons, Inc.	5%
13	Analyzing Turbine Power	Able to analyze Turbine Power	Criteria: According to the scoring guidelines and presentation rubric, full marks are obtained if you follow and do all the practicums well and correctly Form of Assessment : Participatory Activities, Practice/Performance	Practical 2 X 50		Material: Turbine Power References: Fox, Robert W. 2011.Introduction to Fluid Mechanics, 8th edition. New York: John Wiley & Sons, Inc.	10%
14	Calculating Turbine Efficiency	Able to Calculate Turbine Efficiency	Criteria: According to the scoring guidelines and presentation rubric, full marks are obtained if you follow and do all the practicums well and correctly Form of Assessment : Participatory Activities, Practice/Performance	Practical 2 X 50		Material: Turbine Efficiency References: Fox, Robert W. 2011.Introduction to Fluid Mechanics, 8th edition. New York: John Wiley & Sons, Inc.	5%
15	Analyzing Turbine Efficiency	Able to analyze turbine efficiency	Criteria: According to the scoring guidelines and presentation rubric, full marks are obtained if you follow and do all the practicums well and correctly Form of Assessment : Participatory Activities, Practice/Performance	Practical 2 X 50		Material: Turbine Efficiency References: Fox, Robert W. 2011.Introduction to Fluid Mechanics, 8th edition. New York: John Wiley & Sons, Inc.	10%
16	Presentation and discussion of Practicum results	1.Able to present Practicum results 2.Able to discuss Practicum results	Criteria: According to the scoring guidelines and presentation rubric, full marks are obtained if you follow and do all the practicums well and correctly Form of Assessment : Participatory Activities, Practice/Performance	Practical 2 X 50		Material: Final assessment References: Fox, Robert W. 2011.Introduction to Fluid Mechanics, 8th edition. New York: John Wiley & Sons, Inc.	10%

Evaluation Percentage Recap: Case Study

No	Evaluation	Percentage
1.	Participatory Activities	55%
2.	Practice / Performance	45%
		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 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 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.