



MODULE HAND BOOK

MECHANICAL ENGINEERING VOCATIONAL EDUCATION STUDY PROGRAM

FACULTY OF ENGINEERING – UNIVERSITAS NEGERI PADANG

COURSE NAME	CODE	Course Classification	CU		Sem	Version
			Theory	Pract		
Practicum of Basic Machine Phenomenon	MES1.61.4101	Study Program Compulsory Courses / MEVE Core Courses	0	2	5	1
Responsible	Drs. Hasanuddin, MS, Dr. Ir. Arwizet. K, ST. MT, Drs. Purwantono, M.Pd., Dr. Yolli Fernanda, ST, MT			Signature		
INFORMATION	Dean		Head of Department		Coordinator of study program	
	Dr. Fahmi Rizal, M.Pd., MT NIP. 195912041985031004		Drs. Purwantono, M.Pd NIP. 196308041986031002		Drs. Purwantono, M.Pd NIP. 196308041986031002	
Program Learning Outcomes	Program Learning Outcomes (PLO) <ol style="list-style-type: none"> 1. Possess a good ability to apply the basic science (mathematics and natural sciences) and other disciplines in profesional jobs / projects (Knowledge-understanding) <ol style="list-style-type: none"> 1.1. possess a good understanding and can apply the basic concept of mathematics to solve various technical problems 1.2. possess a good understanding and can apply basic the concept of physic to solve various technical problems 1.3. possess a good understanding and can apply basic the concept of chemistry to solve various technical problems 2. Possess a critical and creative thinking in identifying, formulating, problem solving and evaluating various problems in mechanical engineering using the most appropriate and effective scientific method (Engineering analysis, investigations and assessment): <ol style="list-style-type: none"> 2.1. problem identification skills 2.2. problem analysis skills 2.3. problem evaluation skills 3. Possess a good ability in designing, manufacturing and operating machines (Engineering design) 					

- 3.1. able to formulate ideas/concepts into a technical drawing, design and budget plans
- 3.2. able to operate various machines and other engineering equipment with the correct standard operating procedure
- 3.3. able to design a machine or machinery system based on a valid scientific theory
- 3.4. able to realize a concept/design into a prototype, manufacturing process and engineering system
- 4. Possess a good ability to design, organize and evaluate the education and learning process in *mechanical engineering vocational education. (Education design)*
 - 4.1. able to design curriculum and learning process by considering various aspects
 - 4.2. able to organize, control, evaluate and improve the quality of the learning process
 - 4.3. able to develop an interesting, effective and efficient learning medias
- 5. Possess a good ability to adapt to development in science and technology and apply it into professional jobs by considering any non-technical aspects. *(Engineering practice)*
 - 5.1. able to innovate and develop technology in the field of mechanical engineering by considering social, economic and environmental aspects
 - 5.2. able to carry out the optimization process and increase the efficiency of machines or machining system.
 - 5.3. able to improve the performance of machine/ machinery system by applying the information technology
- 6. Possess a good softskil and spirit of lifelong learning *(Transferable skill / softskill)*
 - 6.1. possess a religious character
 - 6.2. possess a spirit of nasionalisme, social sensitivity and environmental consevation orientation
 - 6.3. possess the ability to communicate effectively and work together in teamwork
 - 6.4. possess the ability to transfer science and technology to society to improve the quality of life
 - 6.5. possess a good characters of entrepreneur

Course Learning Outcomes

Course Learning Outcomes (CLO)

CLO	PLO
1. Understand the basic functions of machines in the basic phenomena of the machine	1.1, 1.2, 2.1, 2.2, 3.2,
2. Students are skilled at doing practicum related to basic machine phenomena, assembling, observing, tabulating, analyzing data, making graphs, and interpreting observational data	1.2, 2.1, 2.2, 3.2,
3. Students are able to present and discuss the results of the practical machine basic phenomena that have been done	1.2, 2.1, 2.2, 3.2,

Course descriptions	This subject is a practicum course that discusses and analyzes forces, fluid flow, analysis of material damage and critical rotation which is the basis for making machine construction.	
References	Main References (RU)	
	1. Holowenko, AR, (1993). Machining Dynamics. Jakarta: Erlangga 2. Khurmi, RS, (1978). A Text Book Hydraulics Fluid And Hydraulics Machines. Chand & Company Ltd .: Ram Nagar New Delhi	
	Additional references (RP)	
	1. Sularso & Harua Tahara, (1996). Pumps & Compressors, Selection, Usage, And Maintenance. Jakarta: PT. Pradnya Paramita	
Learning Media	Software	Hardware
		Computers, LCD projectors, truss girders, gear transmission, shear force, friction loss unit, buckling, orifice, impact jet, venturimeter, and whiteboard and its devices
Team Teaching		
Assessment	Resumes, practicum reports, group presentations	
Requirements Subject	There is no	

COURSE SUBJECTS

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
(1)	CLO-1: [PLO-1.2] Students are able to understand the importance of practical machine basic phenomena, understand the functions of practicum tools, and are skilled at using and	The introduction introduces the practicum that will be carried out for one semester, including: 1. testing apparatus, 2. observing data, 3. tabulating, 4. analyzing, 5. make a chart, 6. Interpret data from	An explanation of the importance of the FDM practicum [1x30 '] Question and answer [1x20 '] Demonstration by practical lecturers [1x30 '] Guided practice for using the testing apparatus [1x120	Make a summary and description of the material presented in the resume book	Able to understand the importance of practical machine basic phenomena, understand the functions of practicum tools, and be skilled in using and	RU-1

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
	assembling testing apparatus	pracitcum results	']		assembling testing apparatus	
(2)	CLO-2.1: [PLO-1.1, 1.2, 2.1, 2.2, 3.2] Students are skilled at doing shear force practicum on rods, assemble, observe, tabulate, analyze data, make graphs, and interpret observational data	Observing the phenomena that occur in the shear force practicum. Includes: 2.1.Drawing DBB. 2.2 Calculating the support reaction. 2.3.Drawing a shear force plane. 2.4.Drawing the moment plane	Explanation of the supporting theory of practicum [1x30 ' Question and answer [1x20 ' Demonstration of assembling the testing apparatus according to the theory [1x30 ' Practicum according to the instructions and theoretical rules [1x120 ']	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book • Practicum report 	Skilled in doing shear force practicum on the stem, assemble, observe, tabulate, analyze data, make graphs, and interpret observational data	RU-1 and RU-2
(3)	CLO-2.2: [PLO-1.1, 1.2, 2.1, 2.2, 3.2] Skilled students do the Trunk Frame practicum assembling, observing, tabulating, analyzing data, making graphs, and interpreting observational data	Observing the phenomena that occur in the trunk frame lab 3.1.Painting the DBB stem 3.2 Analyzing rod force 3.3.Create a polygon chart	Explanation of the supporting theory of practicum [1x30 ' Question and answer [1x20 ' Demonstration of assembling the testing apparatus according to the theory [1x30 ' Practicum according to the instructions and theoretical rules [1x120 ']	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book • Practicum report 	Skilled in doing Trunk Frame practicum assembling, observing, tabulating, analyzing data, making graphs, and interpreting observational data	RU-1 and RU-2
(4)	CLO-2.3: [PLO-1.1, 1.2, 2.1, 2.2, 3.2] Skilled students do the	Observing the phenomena that occur in the bending test	Explanation of the supporting theory of practicum [1x30 ']	<ul style="list-style-type: none"> • Make a summary and description of the material 	Skilled in doing bending test practicum	RU-1 and RU-2

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
	bending test practicum assemble, observe, tabulate, analyze data, make graphs, and interpret observational data	practicum 4.1. Analyze critical loads 4.2 Analyzing the slimming factor 4.3. Graph the relationship between critical load and slenderness factor.	Question and answer [1x20 '] Demonstration of assembling the testing apparatus according to the theory [1x30 '] Practicum according to the instructions and theoretical rules [1x120 ']	presented in the resume book • Practicum report	assemble, observe, tabulate, analyze data, make graphs, and interpret observational data	
(5)	CLO-2.4: [PLO-1.1, 1.2, 2.1, 2.2, 3.2] Skilled students do the Quick Return Mechanism practicum assembling, observing, tabulating, analyzing data, making graphs, and interpreting observational data	Observing the phenomena that occur in the fast return mechanism practicum 5.1 Analyze rod speed 5.2 Observing changes in angles 5.3 Painting a speed bar chart 5.4 Painting the acceleration bar diagram	Explanation of the supporting theory of practicum [1x30 '] Question and answer [1x20 '] Demonstration of assembling the testing apparatus according to the theory [1x30 '] Practicum according to the instructions and theoretical rules [1x120 ']	• Make a summary and description of the material presented in the resume book • Practicum report	Skilled in doing the Quick Return Mechanism practicum in assembling, observing, tabulating, analyzing data, making graphs, and interpreting observational data	RU-1 and RU-2
(6)	CLO-2.5: [PLO-1.1, 1.2, 2.1, 2.2, 3.2] Skilled students do practicum Gear Transmission assembles, observes, tabulates, analyzes data, graphs, and interprets	Observing the phenomena that occur in the gear transmission practicum 6.1. Determine expenses and effort 6.2 Analyze the velocity ratio	Explanation of the supporting theory of practicum [1x30 '] Question and answer [1x20 '] Demonstration of assembling the testing apparatus according to the	• Make a summary and description of the material presented in the resume book • Practicum report	Skilled in practicing Gear Transmission assembles, observes, tabulates, analyzes data, graphs, and interprets observational data	RU-1 and RU-2

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
	observational data	6.3 Analyze mechanical gain 6.4 Make a graph between expenses and work.	theory [1x30 '] Practicum according to the instructions and theoretical rules [1x120 ']			
(7)	CLO-2.6: [PLO-1.1, 1.2, 2.1, 2.2, 3.2] Skilled students do practicum Orifis coefficient assembles, observes, tabulates, analyzes data, graphs, and interprets observational data	Observe the phenomena that occur in the orifis coefficient practicum 7.1. Determine the water level 7.2. Analyze far emission 7.3. Analyze the flow rate 7.4 Graph the height relationship with the beam distance	Explanation of the supporting theory of practicum [1x30 '] Question and answer [1x20 '] Demonstration of assembling the testing apparatus according to the theory [1x30 '] Practicum according to the instructions and theoretical rules [1x120 ']	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book • Practicum report 	Skilled in practicing Orifis coefficient assembles, observes, tabulates, analyzes data, graphs, and interprets observational data	RU-1 and RU-2
(8)	CLO-2.7: [PLO-1.1, 1.2, 2.1, 2.2, 3.2] Skilled students do Venturi Meter practicum assemble, observe, tabulate, analyze data, make graphs, and interpret observational data	Observing the phenomena that occur in the venture meter practicum 8.1. Analyze the flow rate 8.2. Analyze the water level in the piezometer tube 8.3. Analyze the venture meter discharge coefficient, velocity	Explanation of the supporting theory of practicum [1x30 '] Question and answer [1x20 '] Demonstration of assembling the testing apparatus according to the theory [1x30 '] Practicum according to the instructions and theoretical rules [1x120 ']	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book • Practicum report 	Skilled in doing Venturi Meter practicum assemble, observe, tabulate, analyze data, make graphs, and interpret observational data	RU-1 and RU-2

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
(9)	CLO-2.8: [PLO-1.1, 1.2, 2.1, 2.2, 3.2] Students are skilled in practicing Momentum Radiation assemble, observe, tabulate, analyze data, make graphs, and interpret observational data	Observing the phenomena that occur in the radiation momentum practicum 9.1 Analyze the flow rate 9.2 Analyze beam speed 9.3. Calculates the emission force over various test fields 9.4, Graph the relationship between the beam velocity and the impact force (impack)	Explanation of the supporting theory of practicum [1x30 ' Question and answer [1x20 ' Demonstration of assembling the testing apparatus according to the theory [1x30 ' Practicum according to the instructions and theoretical rules [1x120 ']	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book • Practicum report 	Skilled in practicing Momentum Radiation assemble, observe, tabulate, analyze data, make graphs, and interpret observational data	RU-1 and RU-2
(10)	CLO-2.9: [PLO-1.1, 1.2, 2.1, 2.2, 3.2] Skilled students do practicum Flow Friction on Pipes assemble, observe, tabulate, analyze data, make graphs, and interpret observational data	Observing the phenomena that occur in the flow friction practicum on the pipe 10.1 Analyze flow rates 10.2 Analyze friction losses in each test tube 10.3 Graph the friction loss against flow rate	Explanation of the supporting theory of practicum [1x30 ' Question and answer [1x20 ' Demonstration of assembling the testing apparatus according to the theory [1x30 ' Practicum according to the instructions and theoretical rules [1x120 ']	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book • Practicum report 	Skilled in doing flow friction practicum on pipes assemble, observe, tabulate, analyze data, make graphs, and interpret observational data	RU-1 and RU-2
(11)	CLO-2.10: [PLO-1.1, 1.2, 2.1, 2.2, 3.2] Skilled students do a sudden enlargement and reduction practicum	Observe the phenomena that occur in sudden enlargement and reduction practicum 11.1 Analyze flow rates	Explanation of the supporting theory of practicum [1x30 ' Question and answer [1x20 ']	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book 	Skilled in practicing Sudden Enlargement and Reduction in assembling,	RU-1 and RU-2

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
	assembling, observing, tabulating, analyzing data, making graphs, and interpreting observational data	11.2 Analyze the losses in sudden change in flow 11.3 Graph the friction loss to flow	Demonstration of assembling the testing apparatus according to the theory [1x30 '] Practicum according to the instructions and theoretical rules [1x120 ']	<ul style="list-style-type: none"> Practicum report 	observing, tabulating, analyzing data, making graphs, and interpreting observational data	
(12)	CLO-2.11: [PLO-1.1, 1.2, 2.1, 2.2, 3.2] Skilled students do the Critical Round practicum assemble, observe, tabulate, analyze data, make graphs, and interpret observational data	Observing the phenomena that occur in the critical lap practicum 12.1 Analyze rotation speed 12.2 Analyze the personal frequency of the system 12.3 Paint the mode of vibration that occurs	Explanation of the supporting theory of practicum [1x30 '] Question and answer [1x20 '] Demonstration of assembling the testing apparatus according to the theory [1x30 '] Practicum according to the instructions and theoretical rules [1x120 ']	<ul style="list-style-type: none"> Make a summary and description of the material presented in the resume book Practicum report 	Skilled in doing Critical Round practicum assemble, observe, tabulate, analyze data, make graphs, and interpret observational data	RU-1 and RU-2
(13)	CLO-3: [PLO-1.1, 3.2, 6.3] Students are able to present and discuss the results of the practicum carried out	Presentation of the results of the practicum carried out	Presentation [4x30 '= 60'] Discussion and Q&A [4x20 '= 40]	<ul style="list-style-type: none"> Presentation Discussion reports and questions and answers 	Able to present and discuss the results of the practicum carried out	
(14)	CLO-3: [PLO-1.1, 3.2, 6.3] Students are able to present and discuss the	Presentation of the results of the practicum carried out	Presentation [4x30 '= 60'] Discussion and Q&A [4x20 '= 40]	<ul style="list-style-type: none"> Presentation Discussion reports and questions and 	Able to present and discuss the results of the practicum	

CLO-2.10	Report	5	V	V		V	V			V										
CLO-2.11	Report	5	V	V		V	V			V										
CLO-3	Presentation	10	V							V									V	
CLO-1-3	UAS	15	V							V									V	
TOTAL		100																		

Assessment Components

Resume	: 20%
Report	: 55%
Presentation	: 10%
<u>Final Exam (UAS)</u>	<u>: 15%</u>
Total	: 100%

Scoring/Grading level description

	Excellent	Good	Satisfy	Fail
ability to describe	Able to describe correctly and completely	Able to describe correctly but not complete	Able to describe but less clear and incomplete	Unable to describe
ability to formulate	Able to formulate correctly and completely	Able to formulate correctly but not complete	Able to formulate but less clear and incomplete	Unable to formulate
ability to calculate	Able to calculate correctly and completely	Able to calculate correctly but not complete	Able to calculate but less clear and incomplete	Unable to calculate
ability to analyze	Able to analyze correctly and completely	Able to analyze correctly but not complete	Able to analyze but less clear and incomplete	Unable to analyze

Scoring and grading system

Score	Quality	Quality score	Designation	Score	Quality	Quality score	Designation
85 – 100	A	4.0	Outstanding	55 – 59	C	2.0	Acceptable
80 – 84	A-	3.6	Excellent	50 – 54	C-	1.6	Poor
75 – 79	B+	3.3	Very good	40 – 49	D	1.0	Poor
70 – 74	B	3.0	Good	≤ 39	E	0.0	Fail
65 – 69	B-	2.6	Good	-	T	-	Tertunda
60 – 64	C+	2.3	Acceptable				

