



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		
Applied Technology Machine	MES1.61.5103	Study Program Compulsory Courses/ MEVE core course	0	2	5	1
Responsible	Delima Yanti, ST, MT, Ph.D; Hendri Nurdin, ST, MT			Signature		
INFORMATION	Dean		Head of Department		Coordinator of study program	
	<u>Dr. Fahmi Rizal, M.Pd., MT</u> NIP. 195912041985031004		<u>Drs. Purwantono, M.Pd</u> NIP. 196308041986031002		<u>Drs. Purwantono, M.Pd</u> NIP. 196308041986031002	
Program Learning Outcomes	Program Learning Outcomes (CPL): <ol style="list-style-type: none"> 1. Able to apply basic science knowledge (mathematics, natural sciences) and other multidisciplinary disciplines which form the basis of Mechanical Engineering Vocational Education in carrying out professional work in their respective fields. (Knowledge-understanding) <ol style="list-style-type: none"> 1.1. Able to show good understanding and implement basic mathematical concepts to solve various problems in the field of mechanical engineering 1.2. Have a high understanding and can implement the basic concepts of physics in the field of mechanical engineering 1.3. Have a high understanding and can implement the basic principles of chemistry in the field of mechanical engineering 2. Able to think critically and creatively in identifying, formulating, problem solving, evaluating various problems in the field of Mechanical Engineering Vocational Education with the most appropriate and effective scientific 					

method(**Engineering analysis, investigations and assessment**)

- 2.1. Able to identify various technical problems in the field of mechanical engineering
- 2.2. Able to analyze various technical problems in the field of mechanical engineering
- 2.3. Able to evaluate various technical problems in the field of mechanical engineering

3. Have a reliable ability in designing, manufacturing and operating machines. (**Engineering design**)

- 3.1. Able to pour ideas, innovations and machine concepts into drawings, working papers, and budget plans
- 3.2. Able to operate machinery and other engineering equipment in accordance with established standards and procedures
- 3.3. Able to design a machine or machinery system based on appropriate scientific theory
- 3.4. Able to realize the concept / design created into a workpiece, manufacturing process and system

4. Have a reliable ability to design, implement and evaluate the learning process in Mechanical Engineering Vocational Education. (**Education design**)

- 4.1. Able to design curriculum and learning process in the field of mechanical engineering by considering various aspects such as psychology, socio-culture of students
- 4.2. Able to implement, control, evaluate and improve the quality of the learning process
- 4.3. Able to develop interesting, effective and efficient learning media

5. Having the ability to adapt and innovate to the development of science and technology and implement it into the goals of education and professional work by considering the non-technical risks that may occur. (**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 the machining system
- 5.3. Implementing information technology & computers into machinery systems to improve performance

6. Have high social and managerial competence who are able to work together, communicate effectively, have an entrepreneurial spirit and character, are environmentally friendly and aware of the importance of lifelong learning. (**Transferable skills / soft skills**)

- 6.1. Has a religious character which is implemented in all personal and professional activities
- 6.2. Have a national spirit, social sensitivity and environmental insight

	<p>6.3. Able to communicate effectively and work together in a team work</p> <p>6.4. Able to transfer science and technology to society to improve the quality of life</p> <p>6.5. Has an entrepreneurial character</p>																						
Course Learning Outcomes	Course Learning Outcomes (CP-MK)																						
	<table border="1"> <thead> <tr> <th>CPMK</th> <th>CPL</th> </tr> </thead> <tbody> <tr> <td>1. Students understand the need for a systematic approach in applied technology machine design</td> <td>2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2</td> </tr> <tr> <td>2. Students can formulate design problems</td> <td>2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2</td> </tr> <tr> <td>3. Students can make several alternative design concepts</td> <td>2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2</td> </tr> <tr> <td>4. Students can evaluate and choose design concepts</td> <td>2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2</td> </tr> <tr> <td>5. Students can detail simple designs so that they can be made</td> <td>2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2</td> </tr> <tr> <td>6. Students can communicate the resulting design systematically</td> <td>2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2</td> </tr> <tr> <td>7. Students know the strategies and ways of making and testing design products</td> <td>2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2</td> </tr> <tr> <td>8. Students can evaluate the achievements of the design products against the specified requirements</td> <td>2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2</td> </tr> <tr> <td>9. Students can create design projects</td> <td>2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2</td> </tr> <tr> <td>10. Group project</td> <td>2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2</td> </tr> </tbody> </table>	CPMK	CPL	1. Students understand the need for a systematic approach in applied technology machine design	2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2	2. Students can formulate design problems	2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2	3. Students can make several alternative design concepts	2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2	4. Students can evaluate and choose design concepts	2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2	5. Students can detail simple designs so that they can be made	2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2	6. Students can communicate the resulting design systematically	2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2	7. Students know the strategies and ways of making and testing design products	2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2	8. Students can evaluate the achievements of the design products against the specified requirements	2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2	9. Students can create design projects	2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2	10. Group project	2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.4, 5.1, 5.2
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Short course descriptions	Provides knowledge about: The application of the use of machines for various purposes																						
References	Main references (RU):																						
	<ol style="list-style-type: none"> 1. Philip Kosky et al., Exploring Engineering: An Introduction to Engineering and Design, Academic Press, 2010 (Main library) 2. Saeed Moaveni, Engineering Fundamentals: An Introduction to Engineering, Cengage Learning, 2011 (Supporting library) 3. Holtzapple & Reece, Foundations of Engineering, McGraw-Hill, 2003 (Supporting references) 																						
	Additional references (RP)																						

Learning Media	Software:	Hardware:
		Computers, whiteboards and accessories, projectors, engineering materials testing machines
Team Teaching		
Assessment	Assignments, Quis, UTS, UAS	
Requirements Subject	No	

COURSE SUBJECTS

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
(1)	CPMK-1.1: (CPL-1.1, 1.2) Students understand the need for a systematic approach in applied technology machine design	Introduction to engineering design. <ul style="list-style-type: none"> The Type of engineering design Designer traits Manage design projects 	Material explanation [1x60 '] Question and answer [1x10 '] Work on assignments [1x30 ']	Make a summary and description of the material presented in the resume book	Able to explain the basic theory of applied technology machines	RU-1, RU-2 and RU-3
(2)	CPMK-1.2: (CPL-1.1, 1.2, .1.3) Students understand the need for a systematic approach in applied technology machine design	Introduction to engineering design. <ul style="list-style-type: none"> Rules in design - The need for a systematic approach Steps in the engineering design process 	Material explanation [1x60 '] Question and answer [1x10 '] Work on assignments [1x30 ']	Make a summary and description of the material presented in the resume book	Able to understand the rules in applied technology machine design	RU-1, RU-2 and RU-3

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
(3)	CPMK-2.:[CPL-1.1, 1.2, .1.3, .2.1, .2.2, .2.3] Students can formulate design problems	Defining the problem <ul style="list-style-type: none"> • Background • Identification of problems • Problem formula • Problem solution 	Material explanation [1x60 '] Question and answer [1x10 '] Work on assignments [1x30 ']	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book. • Create structured assignments 	Be able to formulate TTG machine design problems	RU-1, RU-2 and RU-3
(4)	PMK-3: [CPL-1.1, 1.2, .1.3, .2.1, .2.2, .2.3, .3.1] Students can make several alternative design concepts	Making alternative concepts <ul style="list-style-type: none"> • Alternative design concepts 1 • Alternative design concepts 2 	Material explanation [1x60 '] Question and answer [1x10 '] Work on assignments [1x30 ']	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book. • Create structured assignments 	Able to make alternative concepts	RU-1, RU-2 and RU-3
(5)	PMK-4: [CPL-1.1, . 1.2, 1.3, 2.1, 2.2, .2.3,3.1, .3.4] Students can evaluate and choose design concepts	<ul style="list-style-type: none"> • Evaluating alternative concepts • concept selection 	Material explanation [1x60 '] Question and answer [1x10 '] Work on assignments [1x30 ']	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book. • Create structured assignments 	Able to evaluate concepts	RU-1, RU-2 and RU-3
(6)	PMK-5: [CPL-1.1, . 1.2, 1.3, 2.1, 2.2, .2.3,3.1, .3.4] Students can detail simple designs so that	Detailed design <ul style="list-style-type: none"> • Create detailed designs from the selected concept • Planning the creation 	Material explanation [1x60 '] Question and answer [1x10 '] Work on assignments	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book. 	Be able to detail designs	RU-1, RU-2 and RU-3

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
	they can be made		[1x30 ']	<ul style="list-style-type: none"> Create structured assignments 		
(7)	<p>CPMK-6: [CPL-1.1 ,. 1.2, 1.3, 2.1, 2.2, .2.3,3.1, .3.2, .3.4]</p> <p>Students can communicate the resulting design systematically</p>	<p>Presentation of design</p> <ul style="list-style-type: none"> Present the selected design Describe the advantages and disadvantages of the design 	<p>Material explanation [1x60 ']</p> <p>Question and answer [1x10 ']</p> <p>Work on assignments [1x30 ']</p>	<ul style="list-style-type: none"> Make a summary and description of the material presented in the resume book. Create structured assignments 	Able to communicate TTG machine design	RU-1, RU-2, RU-3
(8)	Mid-test					
(9)	<p>PMK-7: [CPL-1.1 ,. 1.2, 1.3, 2.1, 2.2, .2.3,3.1, .3.2, .3.4]</p> <p>Students know the strategies and ways of making and testing design products</p>	<ul style="list-style-type: none"> Applied technology machine building Applied technology testing machines 	<p>Material explanation [1x60 ']</p> <p>Question and answer [1x10 ']</p> <p>Work on assignments [1x30 ']</p>	<ul style="list-style-type: none"> Make a summary and description of the material presented in the resume book. Create structured assignments 	Able to understand manufacturing and testing strategies	RU-1, RU-2 and RU-3
(10)	<p>PMK-8: [CPL-1.1 ,. 1.2, 1.3, 2.1, 2.2, .2.3,3.1, .3.2, .3.4]</p> <p>Students can evaluate the achievements of the</p>	<p>Design method of performance evaluation of applied technology machines</p>	<p>Material explanation [1x60 ']</p> <p>Question and answer [1x10 ']</p> <p>Work on assignments</p>	<ul style="list-style-type: none"> Make a summary and description of the material presented in the resume book. 	Able to study machine vibration	RU-1, RU-2 and RU-3

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
	design products against the specified requirements		[1x30 ']	<ul style="list-style-type: none"> • Create structured assignments 		
(11)	PMK-9: [CPL-1.1 ,. 1.2, 1.3, 2.1, 2.2, .2.3,3.1, .3.2, .3.4] Students can make a design project report	<ul style="list-style-type: none"> • Collect and evaluate • Making reports from applied technology machines 	Material explanation [1x60 ' Question and answer [1x10 ' Work on assignments [1x30 '	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book. • Create structured assignments 	Able to make final report	RU-1, RU-2 and RU-3
(12)	PMK-10.1: [CPL-1.1 ,. 1.2, 1.3, 2.1, 2.2, .2.3,3.1, .3.2, .3.4, .5.1, .5.2] Students are capable create a group project	Group project <ul style="list-style-type: none"> • Field study 	Material explanation [1x20 ' Question and answer [1x10 ' Work on assignments [1x70 '	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book. • Create structured assignments 	Able to create group projects	RU-1, RU-2 and RU-3
(13)	PMK-10.2: [CPL-1.1 ,. 1.2, 1.3, 2.1, 2.2, .2.3,3.1, .3.2, .3.4, .5.1, .5.2] Students are capable create a group project	Group project <ul style="list-style-type: none"> • Field needs analysis • Sketching the design of applied technology machines • Create a design concept 	Material explanation [1x20 ' Question and answer [1x10 ' Work on assignments [1x70 '	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book. • Create structured assignments 	Able to create group projects	RU-1, RU-2 and RU-3
(14)	PMK-10.3: [CPL-1.1 ,.	Group project	Material explanation	<ul style="list-style-type: none"> • Make a summary 	Able to create	RU-1, RU-2

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
	1.2, 1.3, 2.1, 2.2, .2.3,3.1, .3.2, .3.4, .5.1, .5.2] Students are capable create a group project	<ul style="list-style-type: none"> • Concept selection • Group project creation • testing 	[1x20 ' Question and answer [1x10 ' Work on assignments [1x70 '	and description of the material presented in the resume book. <ul style="list-style-type: none"> • Create structured assignments 	group projects	and RU-3
(15)	PMK-10.4: [CPL-1.1 ,. 1.2, 1.3, 2.1, 2.2, .2.3,3.1, .3.2, .3.4, .5.1, .5.2] Students are capable create a group project	Group project <ul style="list-style-type: none"> • Group project evaluation • Create project reports 	Material explanation [1x20 ' Question and answer [1x10 ' Work on assignments [1x70 '	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book. • Create structured assignments 	Able to create group projects	RU-1, RU-2 and RU-3
(16)	Final test					

Note : 1 credit = (50 'TM + 60' BT + 60 'BM) / Week
 TM = Face to Face (Lecture)
 BT = Structured Learning.

BM = Independent Study
 PS = Simulation Practicum (160 minutes / week)
 PL = Laboratory Practicum (160 minutes / week)

T = Theory (aspects of science)
 P = Practice (aspects of work skills)

The linkage between CPMK and CPL and assessment methods

MSN1.62.4007	Assessment	Point (%)	CPL-1			CPL-2			CPL-3				CPL-4			CPL-5			CPL-6					
			1	2	3	1	2	3	1	2	3	4	1	2	3	1	2	3	1	2	3	4	5	
CPMK-1.1	UTS. 1	5																						
CPMK-2	UTS.2, UTS. 3	10																						
CPMK-3	UTS.4., UTS.5	10																						
CPMK-4	UAS. 1	5																						
CPMK-5	UAS. 2	7.5																						
CPMK-6	UAS. 3	5																						
CPMK-7	UAS. 3																							
CPMK-8	UAS. 4	7.5																						
CPMK-9	UAS. 5	5																						
CPMK-10.1	TG.1	20																						
CPMK-10.2	TG.1																							
CPMK-10.3	TG. 2	15																						
CPMK-10.4	TG. 2																							
Presence		10																						
TOTAL		100																						

Assessment Component

Midterm exam (UTS)	: 25%
Final exams (UAS)	: 30%
Assignment	: 35%
<u>Presence</u>	<u>: 10%</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
The 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	-	Postpone
60 - 64	C +	2.3	Acceptable				

