



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		
Engineering Mechanics	MES1.61.3107	Study Program Compulsory Courses/ MEVE core course	3	0	3	1
Responsible	Drs. Purwanto, M.Pd.			Signature		
INFORMATION	Dean		Head of Department		Coordinator of study program	
	<u>Dr. Fahmi Rizal, M.Pd., MT</u> NIP. 195912041985031004		<u>Drs. Purwanto, M.Pd</u> NIP. 196308041986031002		<u>Drs. Purwanto, M.Pd</u> 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 (<i>Engineering analysis, investigations and assessment</i>): <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

Course Learning Outcomes (CP-MK)

Outcomes	CLO		PLO
	1. Understand the basic concepts and scope of engineering mechanics, including their use in design		2.1, 2.2, 3.3, 3.4
	2. Understand the basic concepts of moments and styles and their summation		2.1
	3. Understand the basic concepts of equilibrium in various frame and machine structures, as well as in distributed loads		2.1
	4. Understand the conceptsthe concept of plasticity and residual strain		2.1, 2.2
Short course descriptions	This subject studies the behavior of structures against the loads acting on them. The general behavior of these structures is deflection and forces (reaction forces and internal forces). This subject has a lot to say about stability, balance of forces, and compatibility between deformations and the type of support it supports. By knowing the forces and deflection that occur, then the structure can be planned or proportional to its dimensions based on the material used so that it is safe and comfortable in accepting the load.		
References	Main References (RU)		
	1. Cannon, JL; Kraige, LG 2008. Mechanical Mechanics: Statics. Translation: Tony Mulia. Erlangga Publisher.		
	2. Popov, EP 2013. Mechanics of Materials. Translation: Zainul Astamar. Yogyakarta: Publisher Andi.		
	Additional references (RP)		
Learning Media	Software:	Hardware:	
		Computer, LCD Projector and Whiteboard and peripherals	
Team Teaching			
Assessment	Mid-Term Exam, Final Exam, resume, group presentation		
Requirements Subject	No		

COURSE SUBJECTS

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
(1)	CLO-1.1: [PLO-1.2, 2.1, 3.3] Students are able to understand the definitions and basic concepts and scope of engineering mechanics	The basic concepts of scalar and vector quantities, international units, and the scope of engineering mechanics	Material description [1x110 '] Frequently asked questions [1x10 '] Discussion [1x30 ']	Make a summary and description of the material presented in the resume book	Be able to explain the basic concepts of scalar and vector quantities, international units, and the scope of engineering mechanics	RU-1
(2)	CLO-2.1: [PLO-1.2, 2.1] Students are able to understand the meaning of forces, moments, and their additions	Understanding force and moment, the addition of force, transmissibility, and the sum of moments	Review material or solve questions by students in front of the class [1x20 '] Material description [1x90 '] Frequently asked questions [1x10 '] Discussion [1x30 ']	<ul style="list-style-type: none"> Make a summary and description of the material presented in the resume book 	Be able to explain definition of force and moment, addition of force, transmissibility, and addition of moments	RU-1 and RU-2
(3)	CLO-2.2: [PLO-1.2, 2.1] Students are able to understand the addition of moments and forces	Varignon theorem and the addition of forces and moments	Review material or solve questions by students in front of the class [1x20 '] Material description [1x90 '] Frequently asked questions [1x10 '] Discussion [1x30 ']	<ul style="list-style-type: none"> Make a summary and description of the material presented in the resume book 	Be able to explain Varignon theorem and the addition of forces and moments	RU-1 and RU-2
(4)	CLO-3.1: [CP-1.2, 2.1, 2.2]	The basic concept of equilibrium and the laws of	Review material or solve questions by students in	<ul style="list-style-type: none"> Make a summary and description of 	Be able to explain the basic concept	RU-1 and RU-2

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
	Students are able to understand the concept of equilibrium	equilibrium	front of the class [1x20 '] Material description [1x90 '] Frequently asked questions [1x10 '] Discussion [1x30 ']	the material presented in the resume book	of equilibrium and the laws of equilibrium	
(5)	CLO-3.2: [CP-1.2, 2.1, 2.2] Students are able to understand equilibrium cases in simple structures	Simple structural equilibrium and free-body diagrams and types of supports	Review material or solve questions by students in front of the class [1x20 '] Material description [1x90 '] Frequently asked questions [1x10 '] Discussion [1x30 ']	<ul style="list-style-type: none"> Make a summary and description of the material presented in the resume book 	Be able to explain simple structural equilibrium and free-body diagrams and types of supports	RU-1 and RU-2
(6)	CLO-3.3: [CP-1.2, 2.1, 2.2] Students are able to understand the equilibrium case in the truss structure structure	Definition of truss structure, definition of two-force rods and connection point method	Review material or solve questions by students in front of the class [1x20 '] Material description [1x90 '] Frequently asked questions [1x10 '] Discussion [1x30 ']	<ul style="list-style-type: none"> Make a summary and description of the material presented in the resume book 	Be able to explain pThe definition of truss structure, the definition of two-force rods and the connection point method	RU-1 and RU-2
(7)	CLO-3.4: [CP-1.2, 2.1, 2.2] Students are able to understand the equilibrium case in the truss structure structure	Cutting method	Review material or solve questions by students in front of the class [1x20 '] Material description [1x90 '] Frequently asked questions [1x10 ']	<ul style="list-style-type: none"> Make a summary and description of the material presented in the resume book 	Be able to explaincutting method	RU-1 and RU-2

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
			Discussion [1x30 ']			
(8)	Mid-Test					
(9)	CLO-3.5: [CP-1.2, 2.1, 2.2] Students are able to understand the equilibrium case in the frame and machine structure	Definition of frame and machine structures, identification of frame and machine structures and examples of cases	Review material or solve questions by students in front of the class [1x20 '] Material description [1x90 '] Frequently asked questions [1x10 '] Discussion [1x30 ']	<ul style="list-style-type: none"> Make a summary and description of the material presented in the resume book 	Be able to explain definition of frame and machine structure, identification of frame and machine structure along with examples of cases	RU-1 and RU-2
(10)	CLO-3.6: [CP-1.2, 2.1, 2.2] Students are able to understand the equilibrium case in the frame and machine structure	Examples of cases of structural equilibrium with the engine	Review material or solve questions by students in front of the class [1x20 '] Material description [1x90 '] Frequently asked questions [1x10 '] Discussion [1x30 ']	<ul style="list-style-type: none"> Make a summary and description of the material presented in the resume book 	Able solve the case example of the equilibrium of the frame and machine structure	RU-1 and RU-2
(11)	CLO-3.7: [CP-1.2, 2.1, 2.2] Students are able to understand the equilibrium case in distributed loads	The concept of load distribution and load distribution on straight stem	Review material or solve questions by students in front of the class [1x20 '] Material description [1x90 '] Frequently asked questions [1x10 '] Discussion [1x30 ']	<ul style="list-style-type: none"> Make a summary and description of the material presented in the resume book 	Able to master concept of load distribution and load distribution on straight rods	RU-1 and RU-2
(12)	CLO-3.8: [CP-1.2, 2.1,	Bending moment diagram	Review material or solve	<ul style="list-style-type: none"> Make a summary 	Able to understand	RU-1 and RU-2

Week	Expected competencies	Topics	Method and strategy for learning	Assignment	Criterion / Assessment indicator	References
	2.2] Students are able to understand the equilibrium case in distributed loads	and shear stress diagram	questions by students in front of the class [1x20 ' Material description [1x90 ' Frequently asked questions [1x10 ' Discussion [1x30 '	and description of the material presented in the resume book	dbending moment diagram and shear stress diagram	
(13)	CLO-4.1: [PLO-1.2, 2.1, 2.2] Students are able to explain the concepts of plasticity and residual strain	The concept of plasticity, understanding stress and strain and stress strain diagrams	Review material or solve questions by students in front of the class [1x20 ' Material description [1x90 ' Frequently asked questions [1x10 ' Discussion [1x30 '	<ul style="list-style-type: none"> • Make a summary and description of the material presented in the resume book 	Be able to explain the concept of plasticity, understanding stress and strain and stress strain diagrams	RU-1 and RU-2
(14)	CLO-4.2: [PLO-1.2, 2.1, 2.2] Students are able to explain the concepts of plasticity and residual strain	Stress-strain diagram and case examples	Review material or solve questions by students in front of the class [1x20 ' Material description [1x90 ' Frequently asked questions [1x10 ' Discussion [1x30 '	<ul style="list-style-type: none"> • Make a summary and a description of the material presented in the resume book 	Able to understand stress-strain diagram and case examples	RU-1 and RU-2
(15)	CLO-1.2: [PLO-1.2, 2.1, 3.3] Students are able to introduce the use of engineering mechanics in design	Use cases of mechanics in engineering design	Review material or solve questions by students in front of the class [1x20 ' Material description [1x90 ' Frequently asked questions	Making material for presentations and group discussions on the use of technical mechanics in design	Able to understand example s of cases of using mechanics in engineering design	RU-1 and RU-2

Assessment Component

Midterm exam (UTS)	: 25%
Final exams (UAS)	: 30%
Presentation	: 20%
Resume	: 15%
<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				

